



Qsan Document - User Manual AegisSAN and AegisSAN LX

**AegisSAN Q500-F20 / Q500-F21 / Q500-F30 Series
AegisSAN Q500-P10 / Q500-P20 Series
AegisSAN F300Q / F400Q / P300Q / P500Q / S300Q Series
AegisSAN LX F600Q / P400Q / P600Q Series
JBOD J300Q Series**

**Version 8.35
November 2013**

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FW versions

AegisSAN Q500 Series: FW 1.0.0

AegisSAN F300Q / F400Q / P300Q / P500Q / S300Q Series: FW 2.2.5

AegisSAN LX F600Q / P400Q / P600Q Series: FW 3.0.9

Login information

User name: admin

Password: 1234

Limitation



CAUTION:

MSD platform does not support SATA 1.5Gb/s HDD after LSI Expander upgrade to FW 2.1.0.



TIP:

QThin (Thin provision) is available in AegisSAN LX FW 3.0.0.

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Preface

About this manual

This manual is the introduction of Qsan storage system and it aims to help users know the operations of the disk array system easily. Information contained in this manual has been reviewed for accuracy, but not for product warranty because of the various environments / OS / settings. Information and specification will be changed without further notice. For any update information, please visit www.QsanTechnology.com and your contact windows.

Before reading this manual, it assumes that you are familiar with computer skills such as hardware, storage concepts and network technology. It also assumes you have basic knowledge of Redundant Array of Independent Disks (RAID), Storage Area Network (SAN), Fibre Channel (FC), Internet SCSI (iSCSI), Serial-attached SCSI (SAS), Serial ATA (SATA), technology.

**CAUTION:**

Do not attempt to service, change, disassemble or upgrade the equipment's components by yourself. Doing so may violate your warranty and expose you to electric shock. Refer all servicing to authorized service personnel. Please always follow the instructions in this user's manual.



Technical Support

Thank you for using Qsan Technology, Inc. products; if you have any question, please e-mail to Support@QsanTechnology.com. We will answer your question as soon as possible.

Tips and Cautions

This manual uses the following symbols to draw attention to important safety and operational information.

Symbol	Meaning	Description
--------	---------	-------------

	TIP	Tips provide helpful information, guidelines, or suggestions for performing tasks more effectively.
	CAUTION	Cautions indicate that failure to take a specified action could result in damage to the software or hardware.

Conventions

The following table describes the typographic conventions used in this manual.

Conventions	Description
Bold	Indicates text on a window, other than the window title, including menus, menu options, buttons, fields, and labels. Example: Click OK button.
<i><Italic></i>	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: copy <source-file> <target-file>.
[] square brackets	Indicates optional values. Example: [a b] indicates that you can choose a, b, or nothing.
{ } braces	Indicates required or expected values. Example: { a b } indicates that you must choose either a or b.
vertical bar	Indicates that you have a choice between two or more options or arguments.
/ Slash	Indicates all options or arguments.
underline	Indicates the default value. Example: [<u>a</u> b]

FCC and CE statements

FCC Statement

This device has been shown to be in compliance with and was tested in accordance with the measurement procedures specified in the Standards and Specifications listed below and as indicated in the measurement report number: xxxxxxxx-F

Technical Standard: FCC Part 15 Class A (Verification)
IC ICES-003

CE Statement

This device has been shown to be in compliance with and was tested in accordance with the measurement procedures specified in the Standards and Specifications listed below and as indicated in the measurement report number: xxxxxxxx-E

Technical Standard: EMC DIRECTIVE 2004/108/EC

(EN55022 / EN55024)

UL Statement

Rack Mount Instructions - The following or similar rack-mount instructions are included with the installation instructions:

1. Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (T_{ma}) specified by the manufacturer.
2. Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
3. Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
4. Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
5. Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

**CAUTION:**

The main purpose of the handles is for rack mount use only. Do not use the handles to carry or transport the systems.

The ITE is not intended to be installed and used in a home, school or public area accessible to the general population, and the thumbscrews should be tightened with a tool after both initial installation and subsequent access to the panel.

Warning: Remove all power supply cords before service

This equipment intended for installation in restricted access location.

- Access can only be gained by SERVICE PERSONS or by USERS who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken.
- Access is through the use of a TOOL or lock and key, or other means of security, and is controlled by the authority responsible for the location.



CAUTION: (English)

Risk of explosion if battery is replaced by incorrect type. Please replace the same or equivalent type battery use and dispose of used batteries according to the instructions.

ATTENTION: (French)

IL Y A RISQUE D'EXPLOSION SI LA BATTERIE EST REMPLACÉE PAR UNE BATTERIE DE TYPE INCORRECT. METTRE AU REBUT LES BATTERIES USAGÉES CONFORMÉMENT AUX INSTRUCTIONS.

VORSICHT: (German)

Explosionsgefahr bei unsachgemäßem Austausch der Batterie. Entsorgung gebrauchter Batterien nach Anleitung.

ADVERTENCIA: (Spanish)

Las baterías pueden explotar si no se manipulan de forma apropiada. No desmonte ni tire las baterías al fuego. Siga las normativas locales al desechar las baterías agotadas.

警告: (Simplified Chinese)

本电池如果更换不正确会有爆炸的危险，请依制造商说明处理用过之电池。

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Overview

Product Overview

This user manual describes how to set up and use the Qsan storage systems. There are four types of chassis available now.



Q212 (2U12bays)



Q224 (2U24bays)



Q316 (3U16bays)



Q424 (4U24bays)



Q460 (4U60bays)

The storage array, available in different configurations of Fibre Channel, GbE iSCSI, 10GbE iSCSI and SAS interfaces, provides a flexible, intelligent, storage area network (SAN) solution for virtualized server environments and the growing demand for data storage. Qsan storage systems can provide non-stop service with a high degree of fault tolerance by using Qsan RAID technology and advanced array management features.

Model Comparison

Qsan storage system **Q500-XXX-Xxxx** and **XXXXQ-Xxxx** stands for the following models.

AegisSAN Q500-XXX stands for front-end interfaces:

- **Q500-F20:** 2 x 8Gb Fibre Channel ports + 2 x GbE iSCSI ports per controller.
- **Q500-F21:** 4 x 8Gb Fibre Channel ports + 2 x GbE iSCSI ports per controller.
- **Q500-F30:** 2 x 16Gb Fibre Channel ports + 2 x GbE iSCSI ports per controller.
- **Q500-P10:** 6 x GbE iSCSI ports per controller.
- **Q500-P20:** 2 x 10GbE iSCSI ports + 2 x GbE iSCSI ports per controller.

AegisSAN XXXXQ stands for front-end interfaces:

- **F300Q:** 2 x 4Gb Fibre Channel ports per controller.
- **F400Q:** 2 x 4Gb Fibre Channel ports + 1 x GbE iSCSI port per controller.
- **P300Q:** 4 x GbE iSCSI ports per controller.
- **P500Q:** 2 x 10GbE iSCSI ports per controller.
- **S300Q:** 2 x 6G SAS ports per controller.

AegisSAN LX XXXXQ stands for front-end interfaces:

- **F600Q:** 4 x 8Gb Fibre Channel ports + 2 x GbE iSCSI ports per controller.
- **P400Q:** 6 x GbE iSCSI ports per controller.
- **P600Q:** 2 x 10GbE iSCSI ports + 2 x GbE iSCSI ports per controller.

JBOD JXXXQ stands for front-end interfaces:

- **J300Q:** 6G SAS JBOD (IN) + 6G SAS JBOD (OUT) ports per controller.

X stands for { **D** | **S** | **C** }:

- **D:** Dual controller.
- **S:** Single controller, but can be upgradable to dual.
- **C:** Single controller only.

xxx stands for chassis height and HDD bays. It can be { **212** | **224** | **316** | **424** | **460** }:

- **212:** 2U 12 bays with 3.5" HDD trays.
- **224:** 2U 24 bays with 2.5" HDD trays.
- **316:** 3U 16 bays with 3.5" HDD trays.
- **424:** 4U 24 bays with 3.5" HDD trays.
- **460:** 4U 60 bays with 3.5" HDD trays.

AegisSAN Q500:

Host Interface	2U12	3U16	4U24
2 x 8Gb FC	Q500-F20-D212	Q500-F20-D316	Q500-F20-D424

+ 2 x GbE iSCSI	Q500-F20-S212	Q500-F20-S316	Q500-F20-S424
4 x 8Gb FC	Q500-F21-D212	Q500-F21-D316	Q500-F21-D424
+ 2 x GbE iSCSI	Q500-F21-S212	Q500-F21-S316	Q500-F21-S424
2 x 16Gb FC	Q500-F30-D212	Q500-F30-D316	Q500-F30-D424
+ 2 x GbE iSCSI	Q500-F30-S212	Q500-F30-S316	Q500-F30-S424
6 x GbE iSCSI	Q500-P10-D212	Q500- P10-D316	Q500- P10-D424
	Q500-P10-S212	Q500- P10-S316	Q500- P10-S424
2 x 10GbE iSCSI	Q500-P20-D212	Q500- P20-D316	Q500- P20-D424
+ 2 x GbE iSCSI	Q500-P20-S212	Q500- P20-S316	Q500- P20-S424

AegisSAN:

Host Interface	2U12	2U24	3U16	4U24
2 x 4Gb FC	F300Q-D212	F300Q-D224	F300Q-D316	F300Q-D424
	F300Q-S212	F300Q-S224	F300Q-S316	F300Q-S424
2 x 4Gb FC	F400Q-D212	F400Q-D224	F400Q-D316	F400Q-D424
+ 1 x GbE iSCSI	F400Q-S212	F400Q-S224	F400Q-S316	F400Q-S424
4 x GbE iSCSI	P300Q-D212	P300Q-D224	P300Q-D316	P300Q-D424
	P300Q-S212	P300Q-S224	P300Q-S316	P300Q-S424
2 x 10GbE iSCSI	P500Q-D212	P500Q-D224	P500Q-D316	P500Q-D424
	P500Q-S212	P500Q-S224	P500Q-S316	P500Q-S424
2 x 6G SAS	S300Q-D212	S300Q-D224	S300Q-D316	S300Q-D424
	S300Q-S212	S300Q-S224	S300Q-S316	S300Q-S424

AegisSAN LX:

Host Interface	2U12	3U16	4U24	4U60
4 x 8Gb FC	F600Q-D212	F600Q-D316	F600Q-D424	F600Q-D460
+ 2 x GbE iSCSI	F600Q-S212	F600Q-S316	F600Q-S424	F600Q-S460
6 x GbE iSCSI	P400Q-D212	P400Q-D316	P400Q-D424	P400Q-D460
	P400Q-S212	P400Q-S316	P400Q-S424	P400Q-S460
2 x 10GbE iSCSI	P600Q-D212	P600Q-D316	P600Q-D424	P600Q-D460
+ 2 x GbE iSCSI	P600Q-S212	P600Q-S316	P600Q-S424	P600Q-S460

JBOD:

Host Interface	2U12	2U24	3U16	4U24	4U60
6G SAS JBOD	J300Q-D212	J300Q-D224	J300Q-D316	J300Q-D424	J300Q-D460
	J300Q-C212	J300Q-C224	J300Q-C316	J300Q-C424	J300Q-C460

The dual controller specific functions such as dual-active, cache mirroring, flexible RG ownership management, management port seamless take-over, no system down time, and etc are not available in **Q500-XXX-Sxxx** and **XXXXQ-Sxxx** series.

Package Contents

The package contains the following items:

- Qsan storage system (x1).
- HDD trays (x12) **(Q212)**.
HDD trays (x16) **(Q316)**.
HDD trays (x24) **(Q424 / Q224)**.
HDD trays (x60) **(Q460)**.
- Power cords (x2) **(Q316 / Q224 / Q212)**.
Power cords (x3) **(Q424 / Q460)**.
- RS-232 cables (x2), one is for console (black color, phone jack to DB9 female), and the other is for UPS (gray color, phone jack to DB9 male).
- LCM with USB (x1) **(Q500)**.
- Rail kit (x1 set).
- Keys, screws for drives and rail kit (x1 packet).
- Disk tool (x1) **(Q460)**.

Hardware

This section provides basic information about the hardware components.



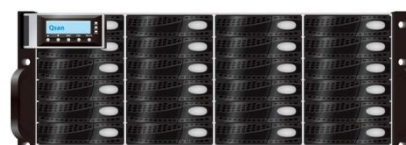
Q212 (2U12bays)



Q224 (2U24bays)



Q316 (3U16bays)



Q424 (4U24bays)



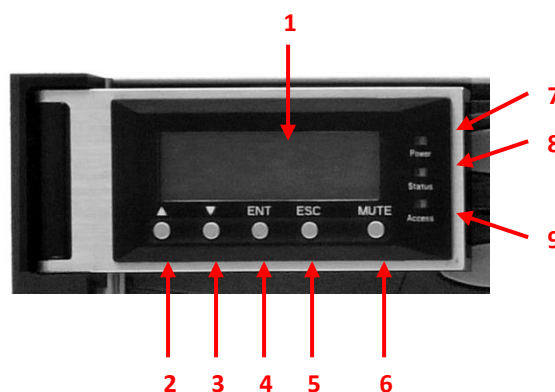
Q460 (4U60bays)

Front View

Q212 / Q224 / Q316 / Q424:

There are five buttons to control LCM (LCD Control Module), including:

▲ (up), ▼ (down), ENT (Enter), ESC (Escape) and MUTE.

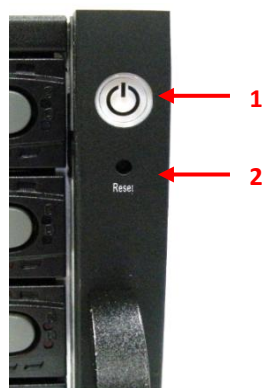


This table shows the items located on the LCD Control Module.

Number	Description
1	LCD display.
2	Up button.
3	Down button.
4	ENT (Enter) button.
5	ESC (Escape) button.
6	MUTE button.
7	Power LED: <ul style="list-style-type: none"> Green: Power ON. Off: Power OFF.
8	Status LED: <ul style="list-style-type: none"> Red: System failure. Off: System OK.
9	Access LED: <ul style="list-style-type: none"> Blue: Host is accessing storage system. Off: No host access attempts.

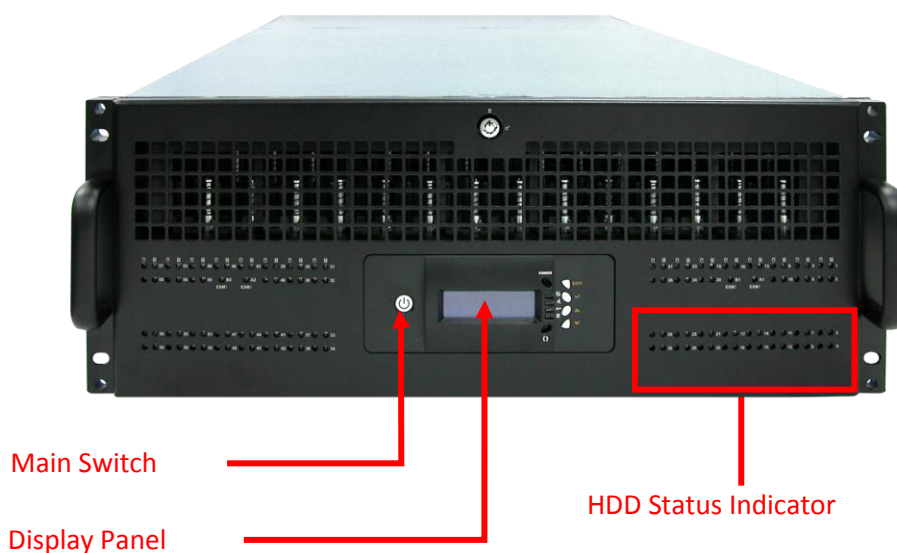
Q500:

There is a power switch button at the right front handle; a LCM with the USB interface at the left front handle which has the same operation with the LCM of **Q212 / Q224 / Q316 / Q424** series.



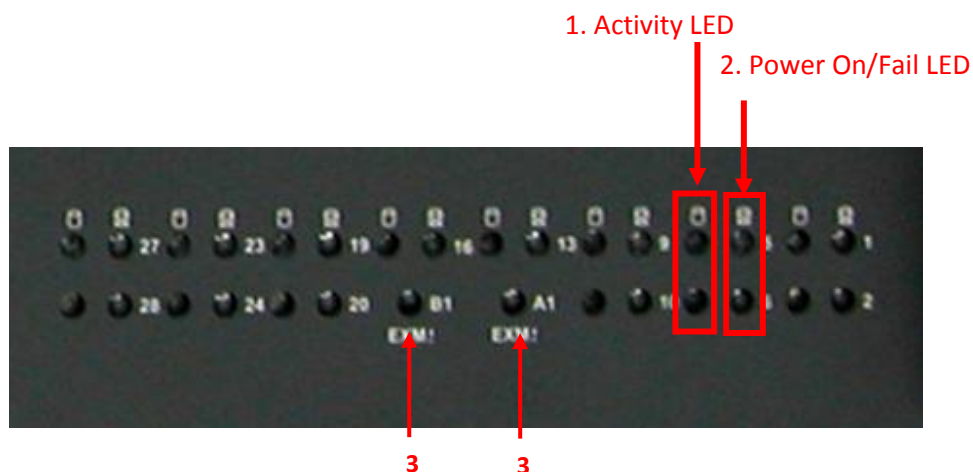
Number	Description
1	Power button. Power LED: <ul style="list-style-type: none"> Blue: Power ON. Off: Power OFF.
2	Reset button, press within 2 seconds to reset the system to default settings. The default resets include: <ul style="list-style-type: none"> Admin password: 1234 IP address: DHCP

Q460:



CAUTION:

When powering off the subsystem, press the Main Switch for 4 seconds and allow at least 3 minutes (during which each disk slot starting from slot #1 until slot #60 will be powered down) for the subsystem to shutdown properly. Then turn off the switches of the 2 Power Supply Fan Modules.

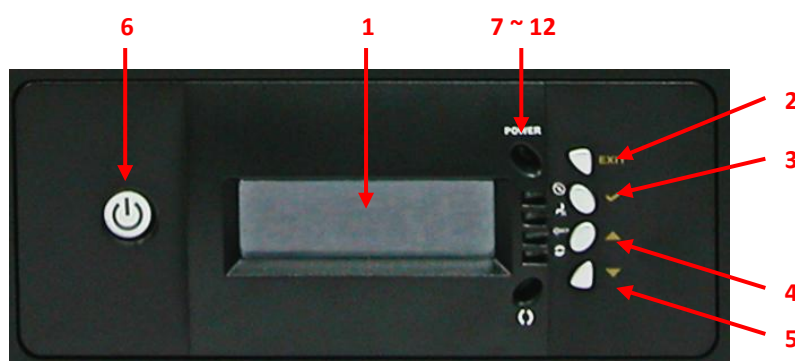


This table shows the items located on the LCD Control Module.

Indicator	Description
1	Activity LED: <ul style="list-style-type: none"> Blinking blue: Indicates the disk drive is busy or being accessed.
2	Power On / Fail LED: <ul style="list-style-type: none"> Green: Indicates the disk drive in this slot is good. Red: Indicates the disk drive in this slot is faulty. Blinking Red: Indicates the disk drive in this slot is rebuilding. Off: Indicates there is no disk drive in this slot.
3	Expander module Fault LED: <ul style="list-style-type: none"> Red: Indicates the Expander module is faulty. Off: Indicates the Expander module is normal..

There are four buttons to control LCM (LCD Control Module), including:

▲ (up), ▼ (down), V (Select), and EXIT (Escape).



This table shows the items located on the LCD Control Module.

Number	Description
--------	-------------

1	LCD display.
2	EXIT (Escape) button.
3	V (Select) button.
4	Up button.
5	Down button.
6	Power button.
7	Power LED: <ul style="list-style-type: none"> Green: Power ON. Off: Power OFF.
8	Power Fail LED: <ul style="list-style-type: none"> Red: If one of the redundant power supply unit fails, this LED will turn to RED and alarm will sound. Off: System OK.
9	Fan Fail LED: <ul style="list-style-type: none"> Red: If a fan fails, this LED will turn red and an alarm will sound. Off: Fan OK.
10	Over Temperature LED: <ul style="list-style-type: none"> Red: If temperature irregularities in the system occur, this LED will turn RED and alarm will sound. Off: Temperature OK.
11	Voltage Warning LED: <ul style="list-style-type: none"> Red: If the output DC voltage is above or below the allowed range, an alarm will sound warning of a voltage abnormality and this LED will turn red. Off: Voltage OK.
12	Activity LED: <ul style="list-style-type: none"> Blinking blue: When the disk array is busy or active. Off: Idle.

Disk Drive Assembly

Q212 / Q224 / Q316 / Q424:

Remove a drive tray. Then install a HDD.

To install SAS drives: align the edge of the drive to the back end of tray; the backplane can directly connect to the drives.

To install SATA drives with 3G/6G MUX boards: align the board edge to the back end of tray; the backplane can connect the drives through the boards.



SAS Drive



SATA Drive

The front of each disk tray has four components:

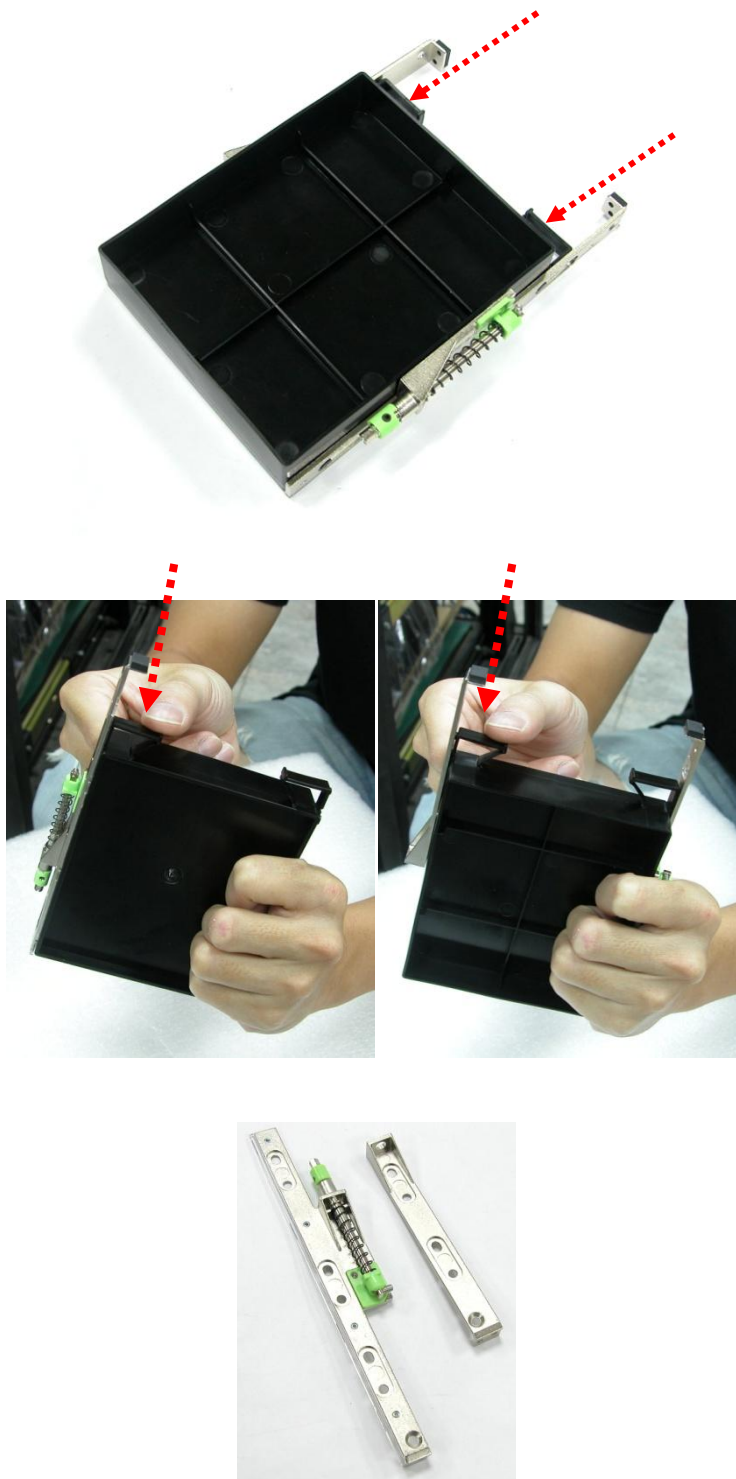


This table provides details about the front components of a disk tray.

Number	Description
1	Power LED: <ul style="list-style-type: none"> Green: Drive is inserted and good. Red: Drive fails. Off: No drive in the tray.
2	Access LED: <ul style="list-style-type: none"> Blue blinking: The drive is being accessed. Off: The drive is not being accessed or no drive in the tray.
3	Tray removal handle.
4	Latch to release the tray and tray handle.

Q460:

1. Prepare the HDD side brackets. Remove them from the dummy disk by pushing the upper sides of the dummy disk as shown below:



2. Place the brackets on both sides of the disk drive and secure them with screws



3. Place the slotted flat head screw.



4. Place the drive carefully in the disk slot.



5. Fix the disk drive using the disk tool that is included in the package.

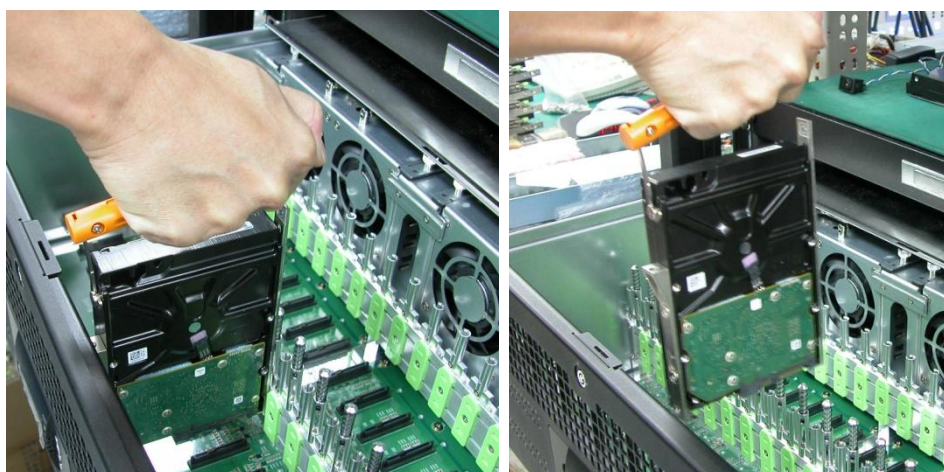


6. Repeat the same steps for the rest of the disks



TIP:

You can use also the disk tool to remove the disk drive in the disk slot.



3TB / 3G MUX Board / 6G MUX Board Limitation

AegisSAN Q500 / AegisSAN LX:

System		JBOD	
Single upgradable	Dual	Single	Dual
Q500-XXX-Sxxx	Q500-XXX-Dxxx		
F600Q-Sxxx	F600Q-Dxxx		
P400Q-Sxxx	P400Q-Dxxx		
P600Q-Sxxx	P600Q-Dxxx	J300Q-Cxxx	J300Q-Dxxx
<= 2TB SATA	No	6G MUX board	No
> 2TB SATA	No	6G MUX board	No
<= 2TB SAS	No	No	No
> 2TB SAS	No	No	No

HDD Type	6G MUX Board	3G MUX Board
3TB	2794 GB	2794 GB
SATA 6Gb/s	SATA 6Gb/s	SATA 3Gb/s
SATA 3Gb/s	SATA 6Gb/s	SATA 3Gb/s
SATA 1.5Gb/s	SATA 6Gb/s	SATA 1.5Gb/s
Without MUX Board		
3TB		2794 GB
SAS 6Gb/s		SAS 6Gb/s
SAS 3Gb/s		SAS 3Gb/s

- (*) AegisSAN Q500, JBOD do not support 3G MUX Board.

AegisSAN:

System		JBOD	
Single upgradable	Dual	Single	Dual
F300Q-Sxxx	F300Q-Dxxx		
F400Q-Sxxx	F400Q-Dxxx		
P300Q-Sxxx	P300Q-Dxxx		
P500Q-Sxxx	P500Q-Dxxx		
S300Q-Sxxx	S300Q-Dxxx	J300Q-Cxxx	J300Q-Dxxx
<= 2TB SATA	No	6G MUX board	No
> 2TB SATA	6G MUX board	6G MUX board	6G MUX board
<= 2TB SAS	No	No	No
> 2TB SAS	No	No	No

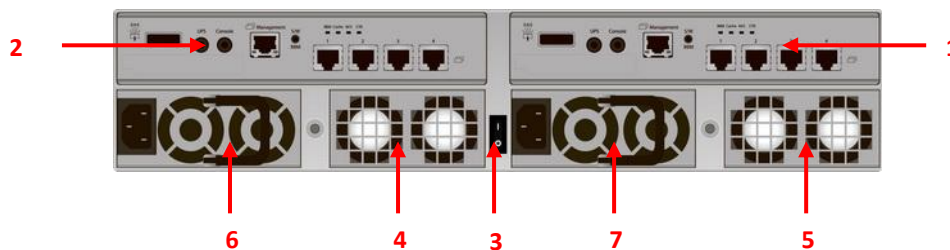
HDD Type	6G MUX Board	3G MUX Board
3TB	2794 GB	2048 GB (*)
SATA 6Gb/s	SATA 3Gb/s	SATA 3Gb/s
SATA 3Gb/s	SATA 3Gb/s	SATA 3Gb/s
SATA 1.5Gb/s	SATA 3Gb/s	N/A (**)
Without MUX Board		
3TB		2794 GB
SAS 6Gb/s		SAS 3Gb/s
SAS 3Gb/s		SAS 3Gb/s

- (*) AegisSAN has 2TB limitation for SATA 3TB hard drive. It has to connect with 6G MUX board to broke 2TB.
- (**) AegisSAN does not support SATA 1.5Gb/s with 3G MUX board.

Rear View

There are four various chassis available. The following examples show the P300Q series.

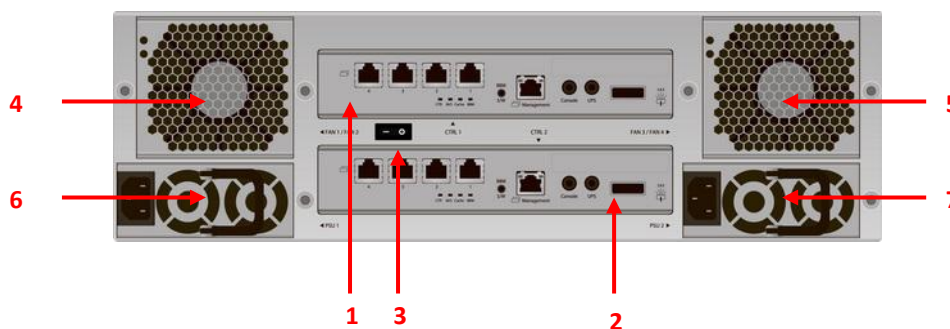
Q224 / Q212 chassis:



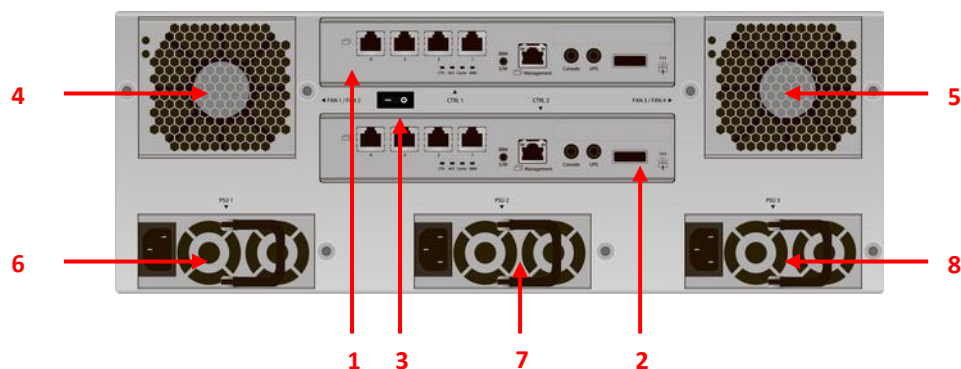
This table describes the rear modules.

Number	Description
1	Controller 1 (CTRL 1).
2	Controller 2 (CTRL 2, only for dual-controller).
3	Power Switch <ul style="list-style-type: none"> : ON. O: OFF.
4	Fan Module (FAN1 / FAN2).
5	Fan Module (FAN3 / FAN4).
6	Power Supply Unit (PSU1).
7	Power Supply Unit (PSU2).
8	Power Supply Unit (PSU3).

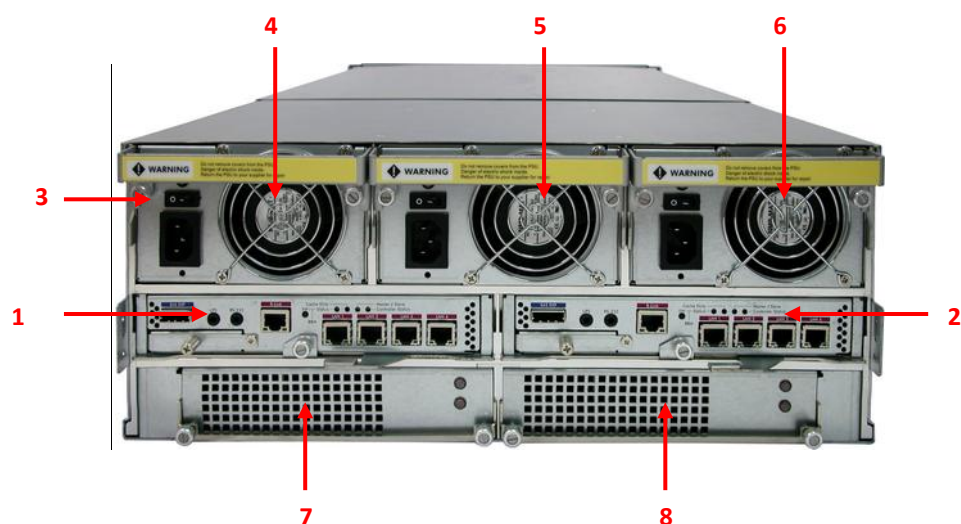
Q316 chassis:



Q424 chassis:



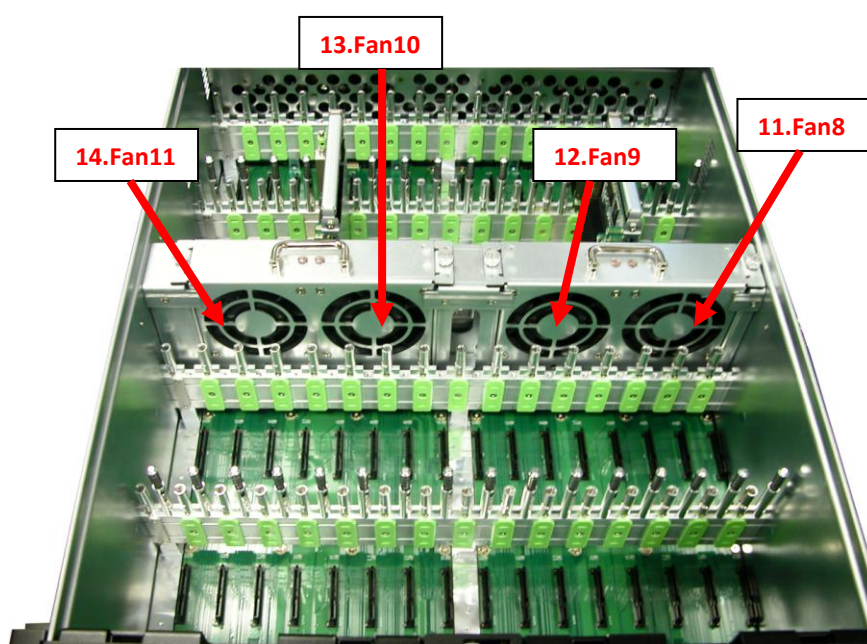
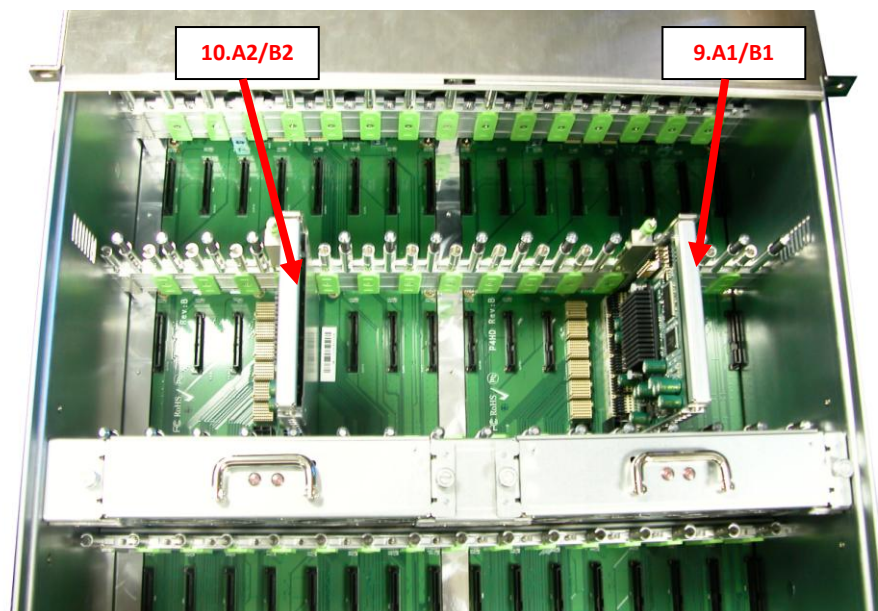
Q460 chassis:



This table describes the rear modules.

Number	Description
1	Controller 1 (CTRL 1).
2	Controller 2 (CTRL 2, only for dual-controller).
3	Power Switch <ul style="list-style-type: none"> : ON. O: OFF.
4	Power Supply Unit (PSU1) and Fan Module (FAN1).
5	Power Supply Unit (PSU2) and Fan Module (FAN2).
6	Power Supply Unit (PSU3) and Fan Module (FAN3).
7	Fan Module (FAN4 / FAN5).
8	Fan Module (FAN6 / FAN7).
9	Expander Module (A1 / single controller). Expander Module (B1 / only for dual-controller).
10	Expander Module (A2 / single controller). Expander Module (B2 / only for dual-controller).

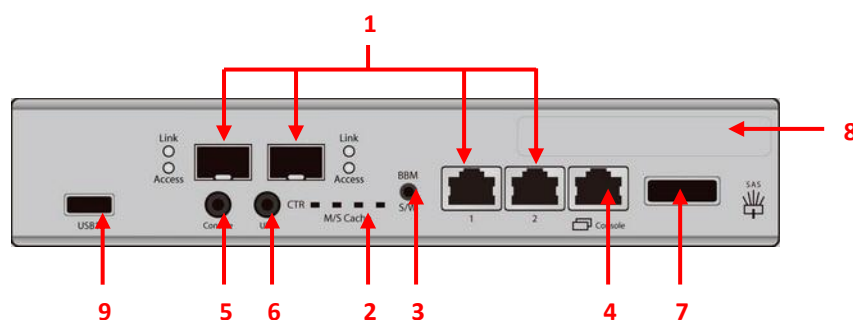
11	Fan Module (FAN8).
12	Fan Module (FAN9).
13	Fan Module (FAN10).
14	Fan Module (FAN11).



There are many various controllers available. With the exception of the host SAN ports, the connections are the same on all modules.

AegisSAN Q500-F20-X424 / Q500-F20-X316 (2 x 8G FC + 2 x GbE iSCSI) controller:

AegisSAN Q500-F30-X424 / Q500-F30-X316 (2 x 8G FC + 2 x GbE iSCSI) controller:



This table describes the rear components.

Number	Description
1	<p>SAN ports (depending on model):</p> <p>AegisSAN Q500:</p> <ul style="list-style-type: none"> Q500-F20: 2 x 8Gb Fibre Channel ports + 2 x GbE iSCSI ports. Q500-F21: 4 x 8Gb Fibre Channel ports + 2 x GbE iSCSI ports. Q500-F30: 2 x 16Gb Fibre Channel ports + 2 x GbE iSCSI ports. Q500-P10: 6 x GbE iSCSI ports. Q500-P20: 2 x 10GbE iSCSI ports + 2 x GbE iSCSI ports. <p>AegisSAN:</p> <ul style="list-style-type: none"> F300Q: 2 x 4Gb Fibre Channel ports. F400Q: 2 x 4Gb Fibre Channel ports + 1 x GbE iSCSI port. P300Q: 4 x GbE iSCSI ports. P500Q: 2 x 10GbE iSCSI ports. S300Q: 2 x 6G SAS ports. <p>AegisSAN LX:</p> <ul style="list-style-type: none"> F600Q: 4 x 8Gb Fibre Channel ports + 2 x GbE iSCSI ports. P400Q: 6 x GbE iSCSI ports. P600Q: 2 x 10GbE iSCSI ports + 2 x GbE iSCSI ports.
2	<p>LED (from left to right for Q424 / Q316, from right to left for Q224 / Q212):</p> <p>Controller health LED:</p> <ul style="list-style-type: none"> Green: Controller status normal. Red: System booting or controller failure. <p>Master slave LED (only for dual controllers):</p> <ul style="list-style-type: none"> Green: This is the Master controller. Off: This is the Slave controller. <p>Dirty cache LED:</p> <ul style="list-style-type: none"> Orange: Data on the cache waiting for flush to disks. Off: No data on the cache. <p>BBM LED (when status button pressed):</p> <ul style="list-style-type: none"> Green: BBM installed and powered. Off: No BBM installed.
3	<p>BBM status button (used to check the battery when the power is off.):</p> <ul style="list-style-type: none"> If the BBM LED shows Green, then the BBM still has power to keep

	data on the cache.
	<ul style="list-style-type: none"> If the BBM LED stays Off, then the BBM power has run out and it cannot provide power for the cache anymore. It needs to be recharged or replaced.
4	Management port.
5	Console port.
6	RS 232 port for UPS.
7	SAS JBOD expansion port.
8	BBM slot.
9	USB
	<ul style="list-style-type: none"> No function. Reserved for the future design purpose.
LED	<p>1GbE Link LED (All):</p> <ul style="list-style-type: none"> Orange: Asserted when a 1G link is established and maintained. Green: Asserted when a 100M link is establish and maintained. <p>1GbE Access LED:</p> <ul style="list-style-type: none"> Blinking green: Asserted when the link is established and packets are being transmitted along with any receive activity. <p>4G FC LED (F300Q / F400Q):</p> <ul style="list-style-type: none"> Constant bright white: Loss of sync. Blinking bright white: Fault, 1 blink / sec. Constant amber: 1G link. Blinking amber: 1G activity, 4 blinks / sec. Constant amber: 2G link. Blinking green: 2G activity, 4 blinks / sec. Constant blue: 4G link. Blinking blue: 4G activity, 4 blinks / sec. <p>8G FC Link LED (Q500-F20):</p> <ul style="list-style-type: none"> Blue: Asserted when an 8G link is established and maintained. Amber: Asserted when a 4G and below link is established and maintained. <p>8G FC Access / fail LED:</p> <ul style="list-style-type: none"> Green: Asserted when the link is establish. Blinking green: Asserted when the link is established and packets are being transmitted along with any receive activity. Red: Asserted when the link can't establish. <p>8G FC Link LED (Q500-F21 / F600Q):</p> <ul style="list-style-type: none"> Blue: Asserted when an 8G link is established and maintained. Yellow: Asserted when a 4G link is established and maintained. Blinking yellow: Asserted when a 2G link is established and maintained. <p>8G FC Access / fail LED:</p> <ul style="list-style-type: none"> Green: Asserted when the link is establish. Blinking green: Asserted when the link is established and packets are being transmitted along with any receive activity. Red: Asserted when the link can't establish. <p>16G FC Link LED (Q500-F30):</p> <ul style="list-style-type: none"> Blue: Asserted when a 16G link is established and maintained. Amber: Asserted when an 8G link is established and maintained. White: Asserted when a 4G and below link is established and maintained. <p>16G FC Access / fail LED:</p>

- Green: Asserted when the link is establish.
- Blinking green: Asserted when the link is established and packets are being transmitted along with any receive activity.
- Red: Asserted when the link can't establish.

10GbE Link LED (Q500-P20 / P500Q / P600Q):

- Orange: Asserted when a 1G link is established and maintained.
- Blue: Asserted when a 10G link is establish and maintained.

10GbE Access LED:

- Yellow: Asserted when the link is established and packets are being transmitted along with any receive activity.

6G SAS Link LED (S300Q):

- Blue: Asserted when a 6G SAS link is establish and maintained.

6G SAS Access / fail LED:

- Yellow: Asserted when the link is established and packets are being transmitted along with any receive activity.
- Red: Asserted when the link can't establish.

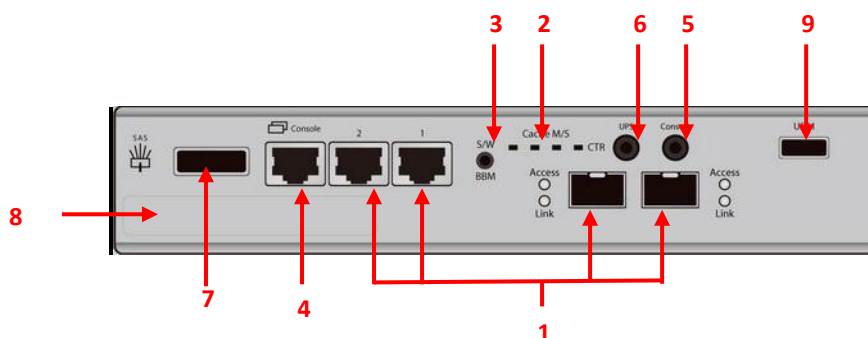


CAUTION:

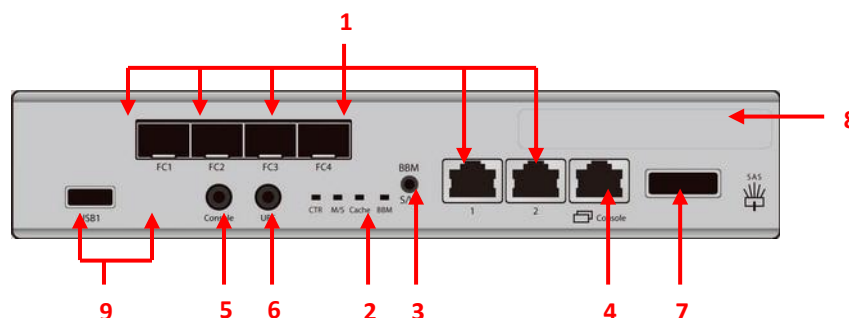
Be aware that when Controller Health LED is in RED, please DO NOT unplug the controller from the system or turn off the power suddenly. This may cause unrecoverable damage, which will not be covered by warranty.

AegisSAN Q500-F20-X212 (2 x 8G FC + 2 x GbE iSCSI) controller:

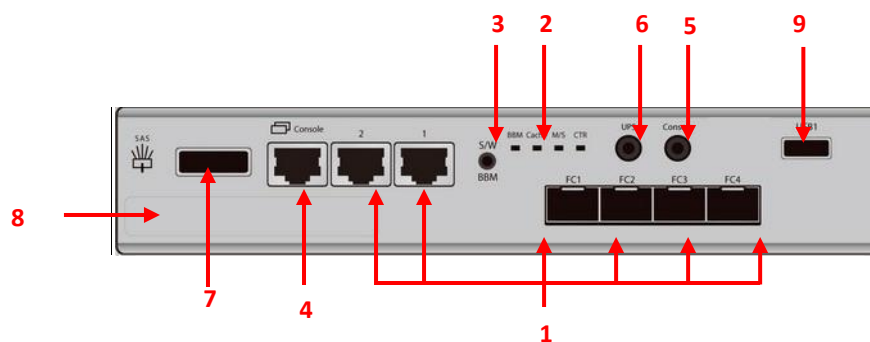
AegisSAN Q500-F30-X212 (2 x 8G FC + 2 x GbE iSCSI) controller:



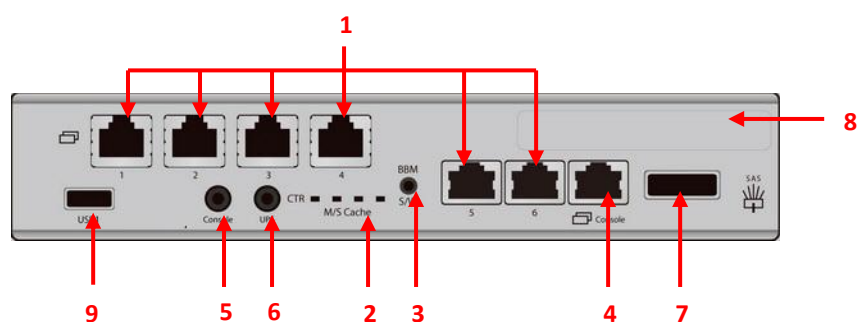
AegisSAN Q500-F21-X424 / Q500-F21-X316 (4 x 8G FC + 2 x GbE iSCSI) controller:



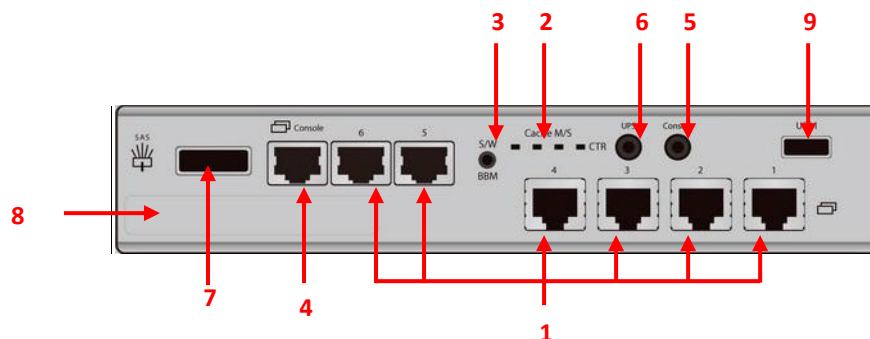
AegisSAN Q500-F21-X212 (4 x 8G FC + 2 x GbE iSCSI) controller:



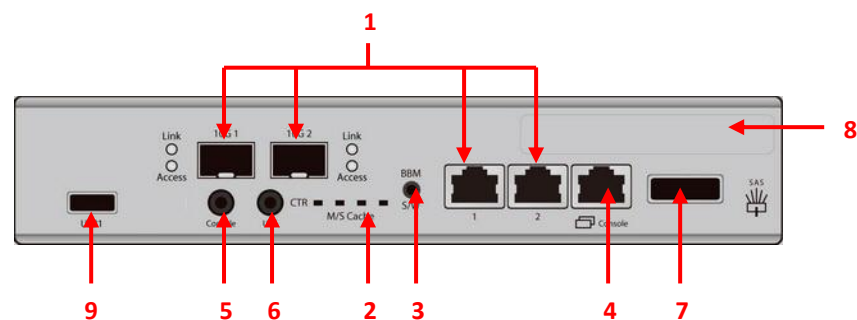
AegisSAN Q500-P10-X424 / Q500-P10-X316 (6 x GbE iSCSI) controller:



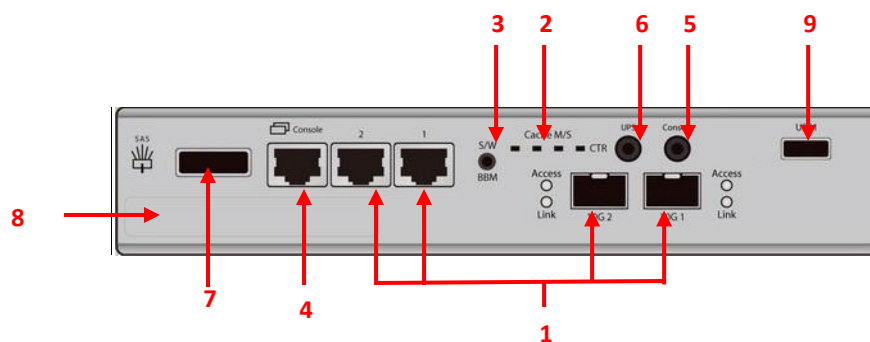
AegisSAN Q500-P10-X212 (6 x GbE iSCSI) controller:



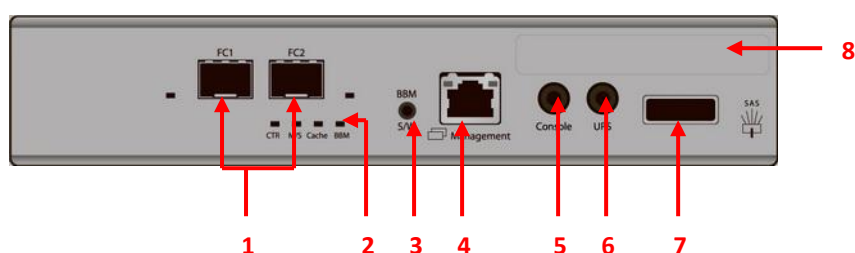
AegisSAN Q500-P20-X424 / Q500-P20-X316 (2 x 10GbE iSCSI + 2 x GbE iSCSI) controller:



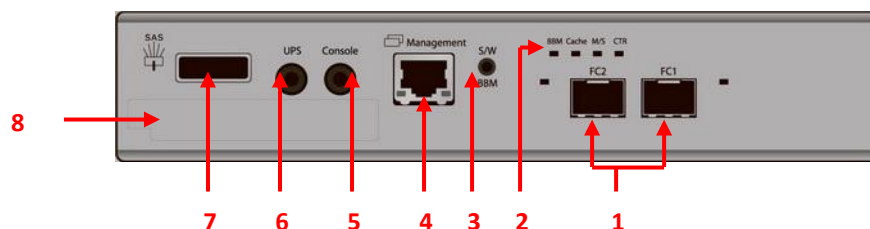
AegisSAN Q500-P20-X212 (2 x 10GbE iSCSI + 2 x GbE iSCSI) controller:



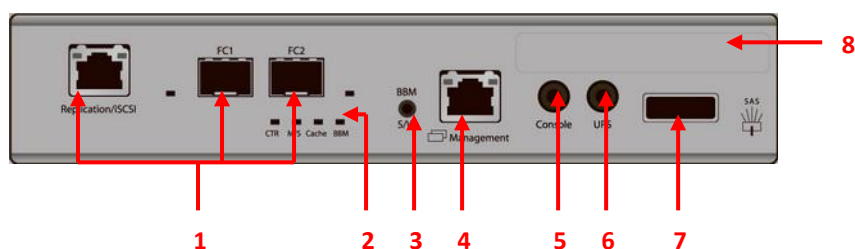
AegisSAN F300Q-X424 / F300Q-X316 (2 x 4Gb FC) controller:



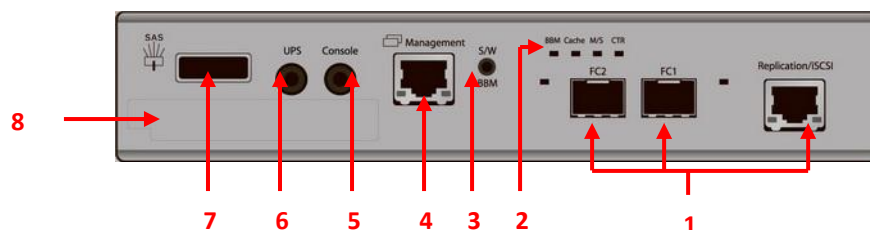
AegisSAN F300Q-X224 / F300Q-X212 (2 x 4Gb FC) controller:



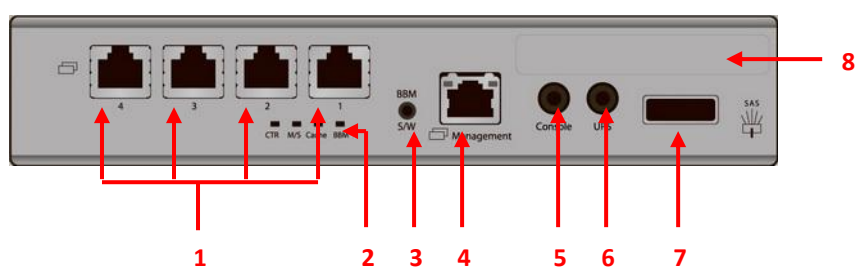
AegisSAN F400Q-X424 / F400Q-X316 (2 x 4Gb FC + 1 x GbE iSCSI) controller:



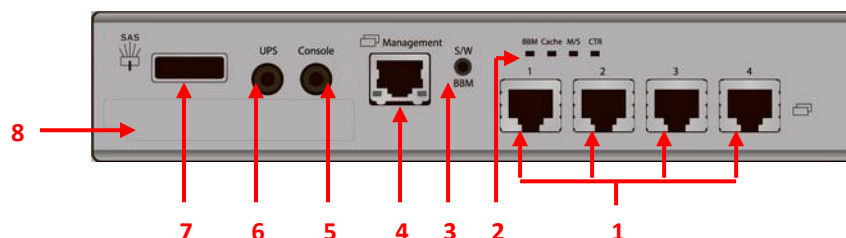
AegisSAN F400Q-X224 / F400Q-X212 (2 x 4Gb FC + 1 x GbE iSCSI) controller:



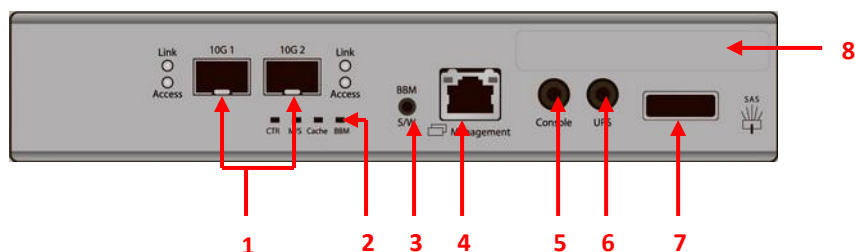
AegisSAN P300Q-X424 / P300Q-X316 (4 x GbE iSCSI) controller:



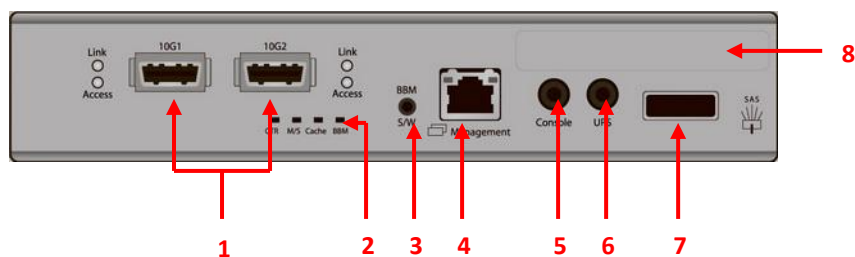
AegisSAN P300Q-X224 / P300Q-X212 (4 x GbE iSCSI) controller:



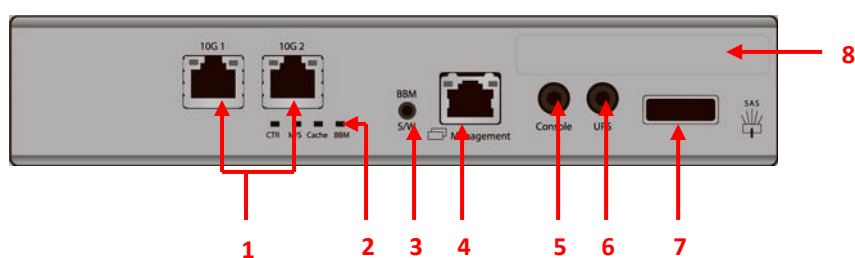
AegisSAN P500Q-X424 SFP+ / P500Q-X316 SFP+ (2 x 10GbE iSCSI) controller:



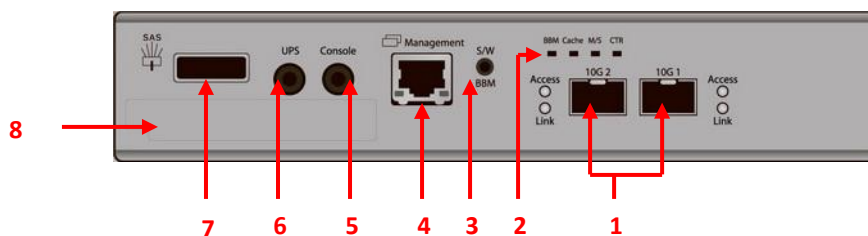
AegisSAN P500Q-X424 CX4 / P500Q-X316 CX4 (2 x 10GbE iSCSI) controller:



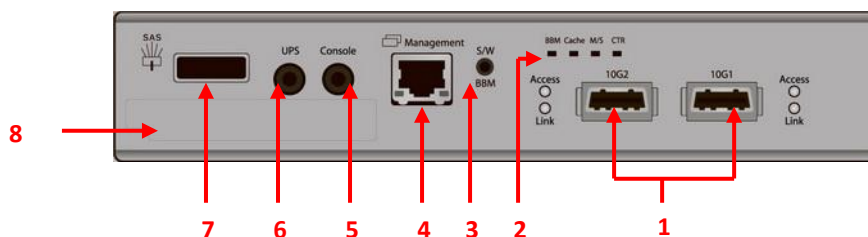
AegisSAN P500Q-X424 10GBASE-T / P500Q-X316 10GBASE-T (2 x 10GbE iSCSI) controller:



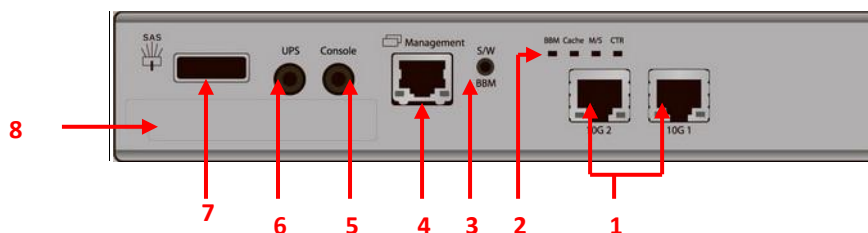
AegisSAN P500Q-X224 SFP+ / P500Q-X212 SFP+ (2 x 10GbE iSCSI) controller:



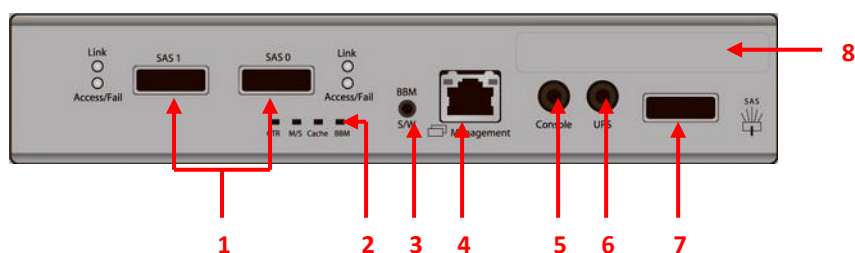
AegisSAN P500Q-X224 CX4 / P500Q-X212 CX4 (2 x 10GbE iSCSI) controller:



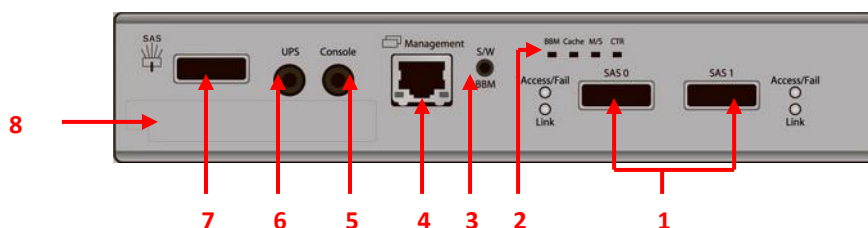
AegisSAN P500Q-X224 10GBASE-T / P500Q-X212 10GBASE-T (2 x 10Gb iSCSI) controller:



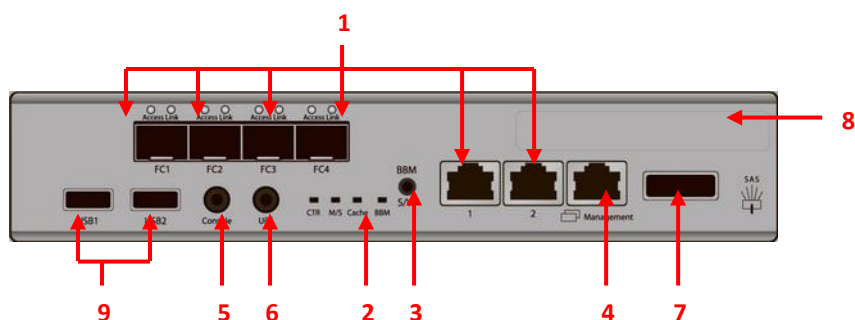
AegisSAN S300Q-X424 / S300Q-X316 (2 x 6G SAS) controller:



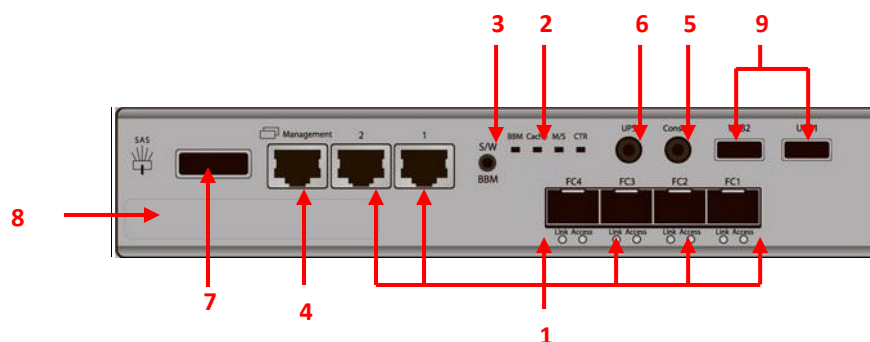
AegisSAN S300Q-X224 / S300Q-X212 (2 x 6G SAS) controller:



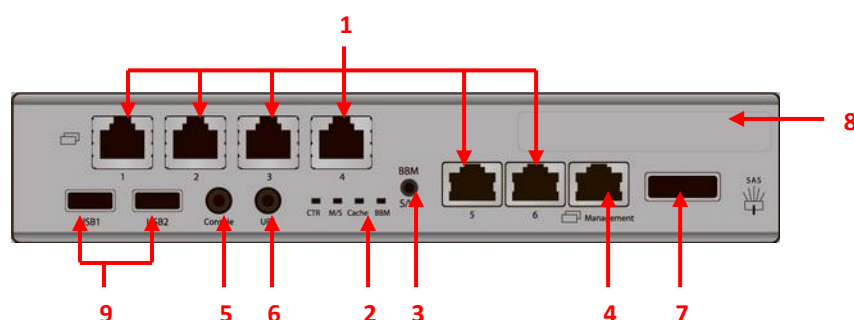
AegisSAN LX F600Q-X424 / F600Q-X316 (2 x 8Gb FC + 2 x GbE iSCSI) controller:



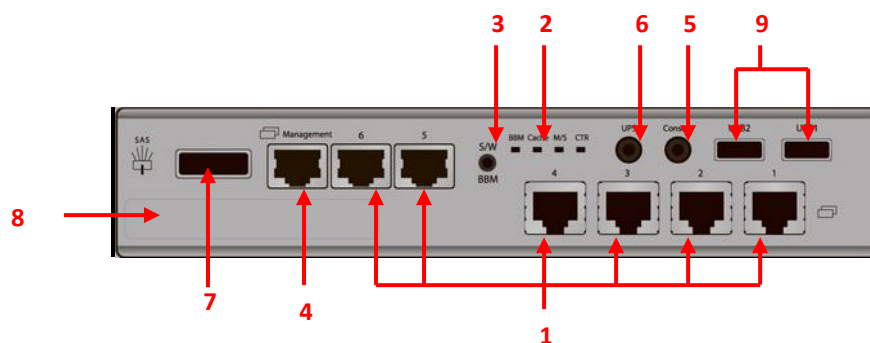
AegisSAN LX F600Q-X212 (2 x 8Gb FC + 2 x GbE iSCSI) controller:



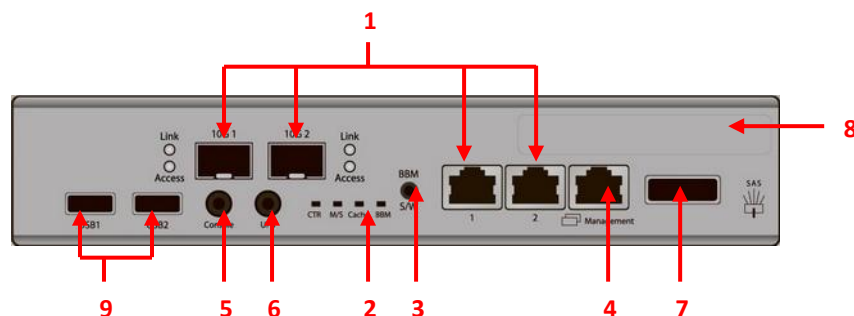
AegisSAN LX P400Q-X424 / P400Q-X316 (6 x GbE iSCSI) controller:



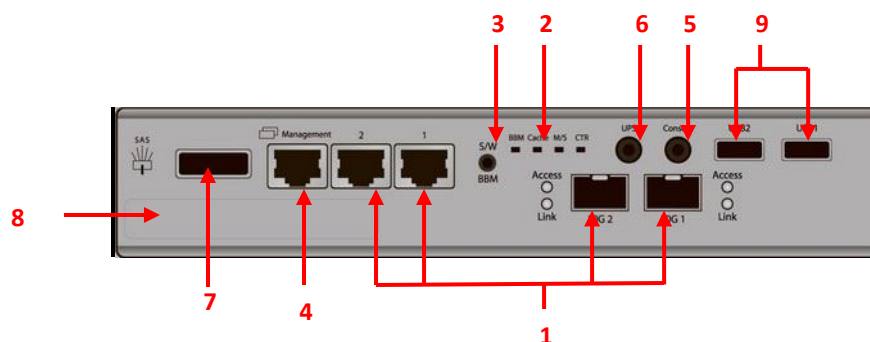
AegisSAN LX P400Q-X212 (6 x GbE iSCSI) controller:



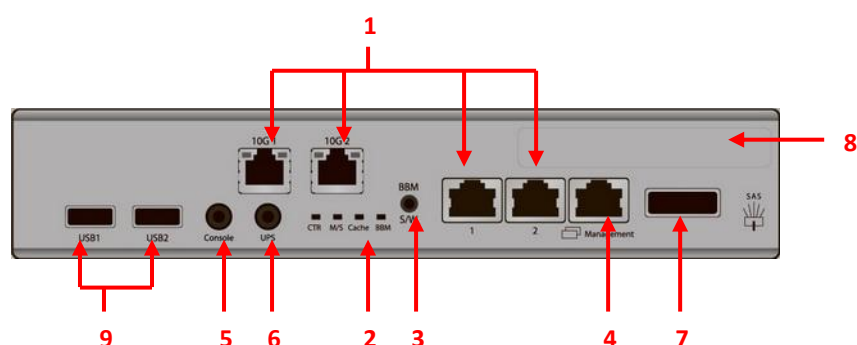
AegisSAN LXP600Q-X424 SFP+ / P600Q-X316 SFP+ (2 x 10GbE iSCSI + 2 x GbE iSCSI) controller:



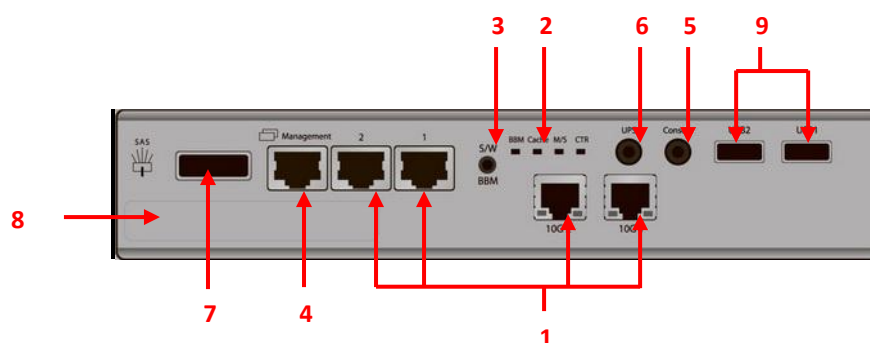
AegisSAN LX P600Q-X212 SFP+ (2 x 10GbE iSCSI + 2 x GbE iSCSI) controller:



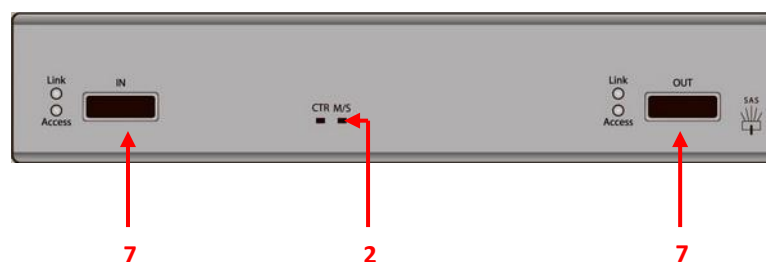
AegisSAN LX P600Q-X424 10GBASE-T / P600Q-X316 10GBASE-T (2 x 10GbE iSCSI + 2 x GbE iSCSI) controller:

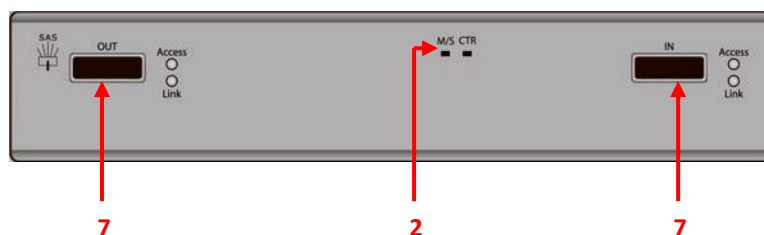


AegisSAN LX P600Q-X212 10GBASE-T (2 x 10GbE iSCSI + 2 x GbE iSCSI) controller:



JBOD J300Q-X424 / J300Q-X316 (6G SAS) JBOD controller:



JBOD J300Q-X224 / J300Q-X212 (6G SAS) JBOD controller:


RAID Concepts

RAID is the abbreviation of Redundant Array of Independent Disks. The basic idea of RAID is to combine multiple drives together to form one large logical drive. This RAID drive obtains performance, capacity and reliability than a single drive. The operating system detects the RAID drive as a single storage device.

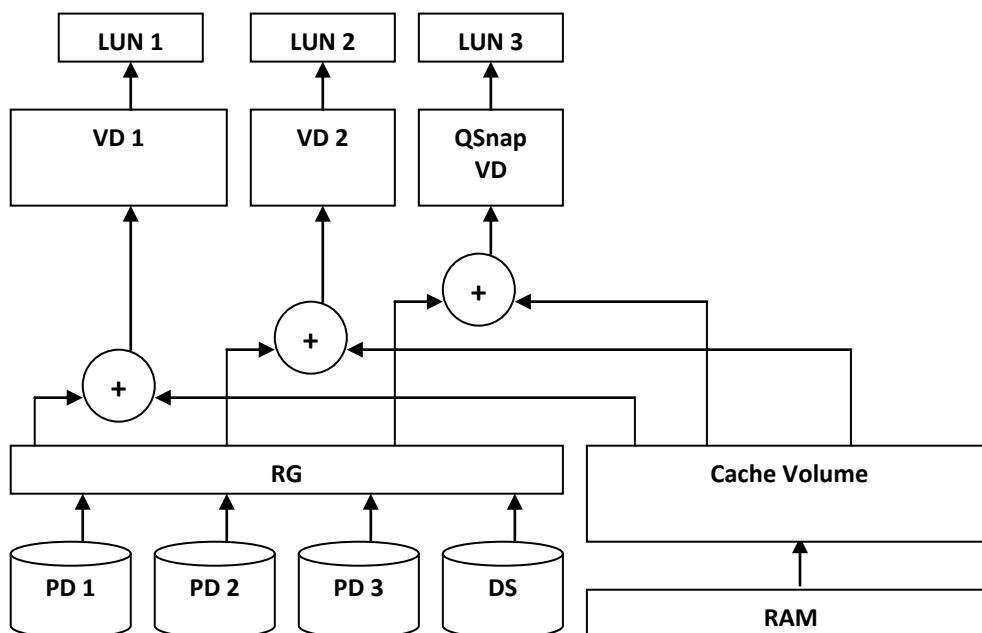
RAID Levels

There are various RAID levels with different degrees of data protection, data availability, and performance. A description of supported RAID levels follow:

Type	Description	Min. No. of Drives
RAID 0	Disk striping.	1
RAID 1	Disk mirroring over two disks.	2
N-way mirror	Extension to RAID 1 level. It has N copies of the disk.	N
RAID 3	Striping with parity on the dedicated disk.	3
RAID 5	Striping with interspersed parity over the member disks.	3
RAID 6	2-dimensional parity protection over the member disks.	4
RAID 0+1	Mirroring of the member RAID 0 volumes.	4
RAID 10	Striping over the member RAID 1 volumes.	4
RAID 30	Striping over the member RAID 3 volumes.	6
RAID 50	Striping over the member RAID 5 volumes.	6
RAID 60	Striping over the member RAID 6 volumes.	8
JBOD	The abbreviation of <i>Just a Bunch Of Disks</i> . Independently address a drive.	1

Volume Relationship

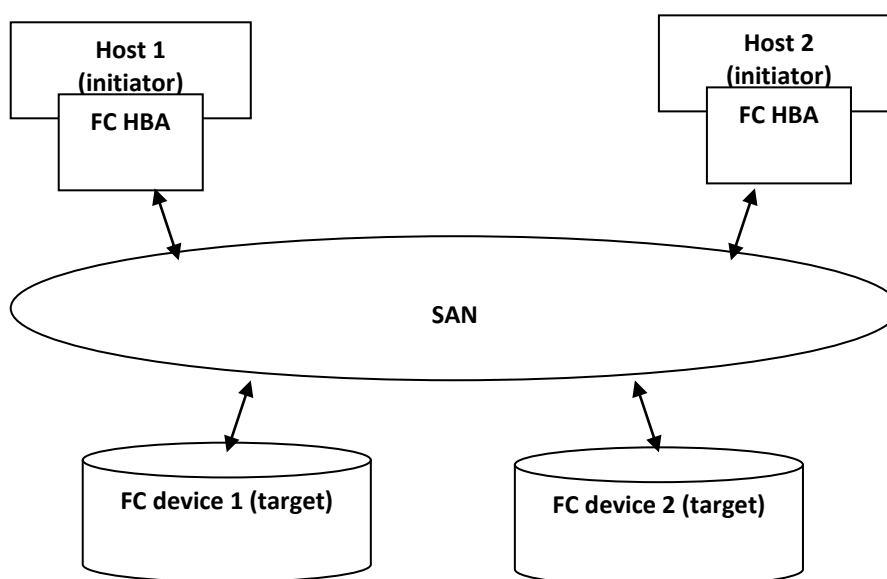
The following graphic is the volume structure which Qsan has designed. It describes the relationship of RAID components.



One RG (RAID group) consists of a set of VDs (Virtual Disk) and owns one RAID level attribute. Each RG can be divided into several VDs. The VDs in one RG share the same RAID level, but may have different volume capacity. All VDs share the CV (Cache Volume) to execute the data transaction. LUN (Logical Unit Number) is a unique identifier, in which users can access through SCSI commands.

Fibre Channel Concepts

Fibre channel started use primarily in the supercomputer field, but has become the standard connection type for storage area networks (SAN) in enterprise storage.

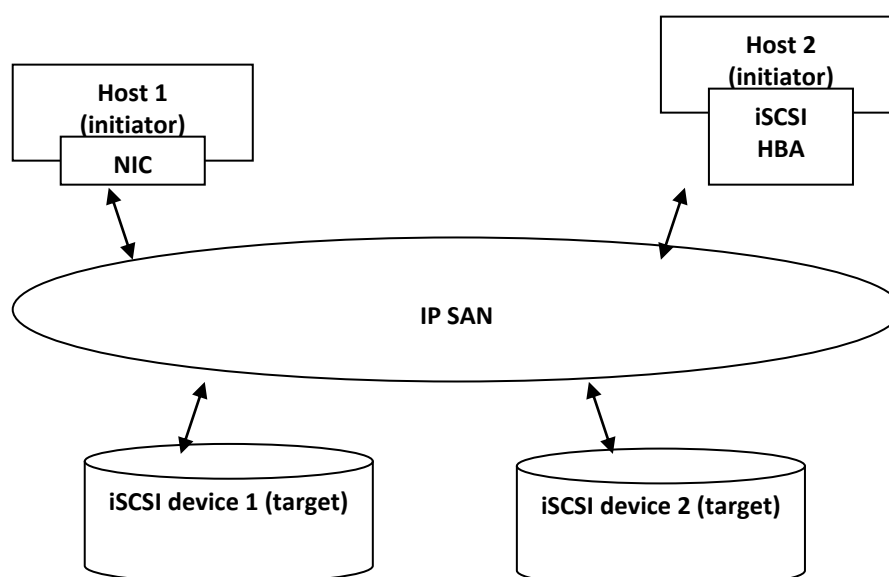


The target is the storage device itself or an appliance which controls and serves volumes or virtual volumes. The target is the device which performs SCSI commands or bridges to an attached storage device.

iSCSI Concepts

iSCSI (Internet SCSI) is a protocol which encapsulates SCSI (Small Computer System Interface) commands and data in TCP/IP packets for linking storage devices with servers over common IP infrastructures. iSCSI provides high performance SANs over standard IP networks like LAN, WAN or the Internet.

IP SANs are true SANs (Storage Area Networks) which allow several servers to attach to an infinite number of storage volumes by using iSCSI over TCP/IP networks. IP SANs can scale the storage capacity with any type and brand of storage system. In addition, it can be used by any type of network (Ethernet, Fast Ethernet, Gigabit Ethernet, and 10 Gigabit Ethernet) and combination of operating systems (Microsoft Windows, Linux, Solaris, Mac, etc.) within the SAN network. IP-SANs also include mechanisms for security, data replication, multi-path and high availability.



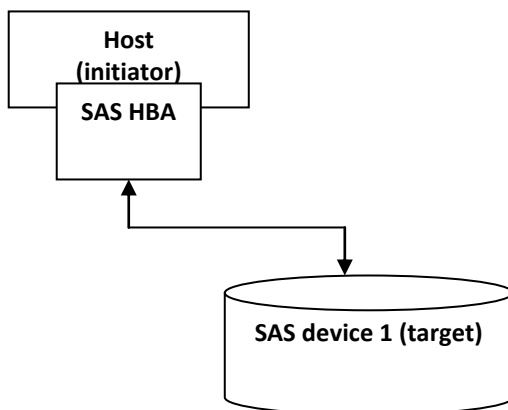
Storage protocol, such as iSCSI, has “two ends” in the connection. These ends are initiator and target. In iSCSI, we call them iSCSI initiator and iSCSI target. The iSCSI initiator requests or initiates any iSCSI communication. It requests all SCSI operations like read or write. An initiator is usually located on the host side (either an iSCSI HBA or iSCSI SW initiator).

The target is the storage device itself or an appliance which controls and serves volumes or virtual volumes. The target is the device which performs SCSI command or bridge to an attached storage device.

SAS Concepts

Serial-attached SCSI offers advantages over older parallel technologies. The cables are thinner, and the connectors are less bulky. Serial data transfer allows the use of longer cables than parallel data transfer.

The target is the storage device itself or an appliance which controls and serves volumes or virtual volumes. The target is the device which performs SCSI command or bridge to an attached storage device.



2

Installation

Installation Overview

Before starting, prepare the following items:

- A management computer with a Gigabit Ethernet NIC (recommend) on the same network as the Qsan storage system.
- Connection cables:
 - **All:** Use CAT 5e, or CAT 6 (recommend) network cables for the management port.

AegisSAN Q500:

- **Q500-F20 / Q500-F21 / Q500-F30 / Q500-P20** : Fibre Channel cables.
- **Q500-P10:** CAT 5e, or CAT 6 (recommend) network cables.

AegisSAN:

- **F300Q / F400Q / P500Q SFP+:** Fibre Channel cables.
- **F400Q / P300Q:** CAT 5e, or CAT 6 (recommend) network cables.
- **P500Q 10GBASE-T:** CAT 6 network cables.
- **S300Q:** SAS cables.

AegisSAN LX:

- **F600Q / P600Q SFP+:** Fibre Channel cables.
- **P400Q / P600Q:** CAT 5e, or CAT 6 (recommend) network cables.
- **P600Q 10GBASE-T:** CAT 6 network cables.

JBOD:

- **J300Q:** SAS cables.

- Prepare a storage system configuration plan by the network administrator. The plan should include network information for the management port and iSCSI data ports. If using static IP addresses, please prepare a list of the static IP addresses, the subnet mask, and the default gateway.
- Switches
 - **All:** Gigabit switches (optional) for connecting management port.

AegisSAN Q500:

- **Q500-F20 / Q500-F21 / Q500-F30:** Fibre Channel switches (optional).

- **Q500-F20 / Q500-F21 / Q500-F30 / Q500-P10 / Q500-P20:** Gigabit switches (recommended). Or Gigabit switches with VLAN / LCAP / Trunking (optional).
- **Q500-P20:** 10 Gigabit switches with VLAN / LCAP / Trunking (optional).

AegisSAN:

- **F300Q / F400Q:** Fibre Channel switches (optional).
- **F400Q / P300Q:** Gigabit switches (recommended). Or Gigabit switches with VLAN / LCAP / Trunking (optional).
- **P500Q:** 10 Gigabit switches with VLAN / LCAP / Trunking (optional).
- **S300Q:** SAS switches (optional).

AegisSAN LX:

- **F600Q:** Fibre Channel switches (optional).
- **P400Q / P600Q:** Gigabit switches (recommended). Or Gigabit switches with VLAN / LCAP / Trunking (optional).
- **P600Q:** 10 Gigabit switches with VLAN / LCAP / Trunking (optional).
- CHAP security information, including CHAP username and secret (optional).
- For dual-controller systems, it is recommended that the host logon to the target twice (both Controller 1 and Controller 2), and then the MPIO should setup automatically.
- For an iSCSI dual-controller system, install an iSNS server on the same storage area network (recommended).

Drive Slot Numbering

The drives can be installed into any slot in the enclosure. Slot numbering is reflected in Web UI.

Q212:

Slot 1	Slot 4	Slot 7	Slot 10
Slot 2	Slot 5	Slot 8	Slot 11
Slot 3	Slot 6	Slot 9	Slot 12

Q224:

Slot 1	Slot 5	Slot 9	Slot 13	Slot 17	Slot 21
Slot 2	Slot 6	Slot 10	Slot 14	Slot 18	Slot 22
Slot 3	Slot 7	Slot 11	Slot 15	Slot 19	Slot 23
Slot 4	Slot 8	Slot 12	Slot 16	Slot 20	Slot 24

Q316:

Slot 1	Slot 5	Slot 9	Slot 13
Slot 2	Slot 6	Slot 10	Slot 14
Slot 3	Slot 7	Slot 11	Slot 15
Slot 4	Slot 8	Slot 12	Slot 16

Q424:

Slot 1	Slot 7	Slot 13	Slot 19
Slot 2	Slot 8	Slot 14	Slot 20
Slot 3	Slot 9	Slot 15	Slot 21
Slot 4	Slot 10	Slot 16	Slot 22
Slot 5	Slot 11	Slot 17	Slot 23
Slot 6	Slot 12	Slot 18	Slot 24

Q460:

57	53	49	46	43	39	35	31	27	23	19	16	13	9	5	1
58	54	50	B2	A2	40	36	32	28	24	20	B1	A1	10	6	2
59	55	51	47	44	41	37	33	29	25	21	17	14	11	7	3
60	56	52	48	45	42	38	34	30	26	22	18	15	12	8	4



TIP:

Install at least one drive in Slot 1 to 4 (marked gray slots). System event logs are saved in these drives. Otherwise, event logs no longer exist after a reboot.

System Installation and Deployment

Q212 / Q224 / Q316 / Q424 / Q460:

Using the following instructions to install and deploy the storage system.

- Install the BBM (Battery Backup Module) in their appropriate controllers if needed. The following examples show the F600Q.



- BBM supports hot pluggable. Regardless of the system is turned on or off.
- Remove the cover of BBM.
- Insert the BBM.
- Tighten the BBM and use screws to lock the both sides.

Q500:

- Install BBM for AegisSAN Q500 series models. In all Q500 models, BBM module is not attached to the controller cage.
 - For 3U16 and 4U24 models, BBM module is located between two controller cages. BBM module is inserted into the system chassis and connected to the backplane.



- For 2U12 model, BBM module is located inside the right fan cage (fan3/4 module).
- BBM will ONLY support controller 1.
- At the rear, check that the Master Controller is in its slot (CTRL 1).

- If desired, install the optional Slave Controller in its slot (CTRL 2, only for dual-controller).



CAUTION:

When running on dual controller mode, please make sure both controllers have the same DIMM on each corresponding memory slot. Failing to do so will result in controller malfunction, which will not be covered by warranty.

- Install the Rail Kit onto the unit and insert it into the rack.

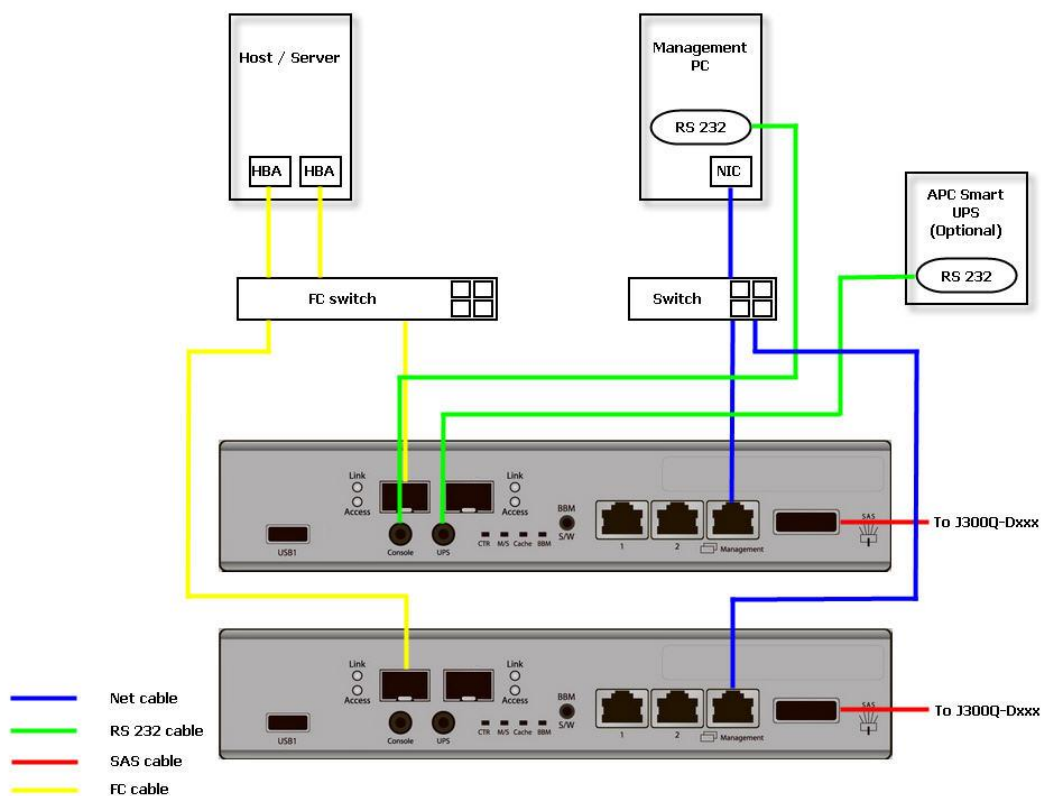


CAUTION:

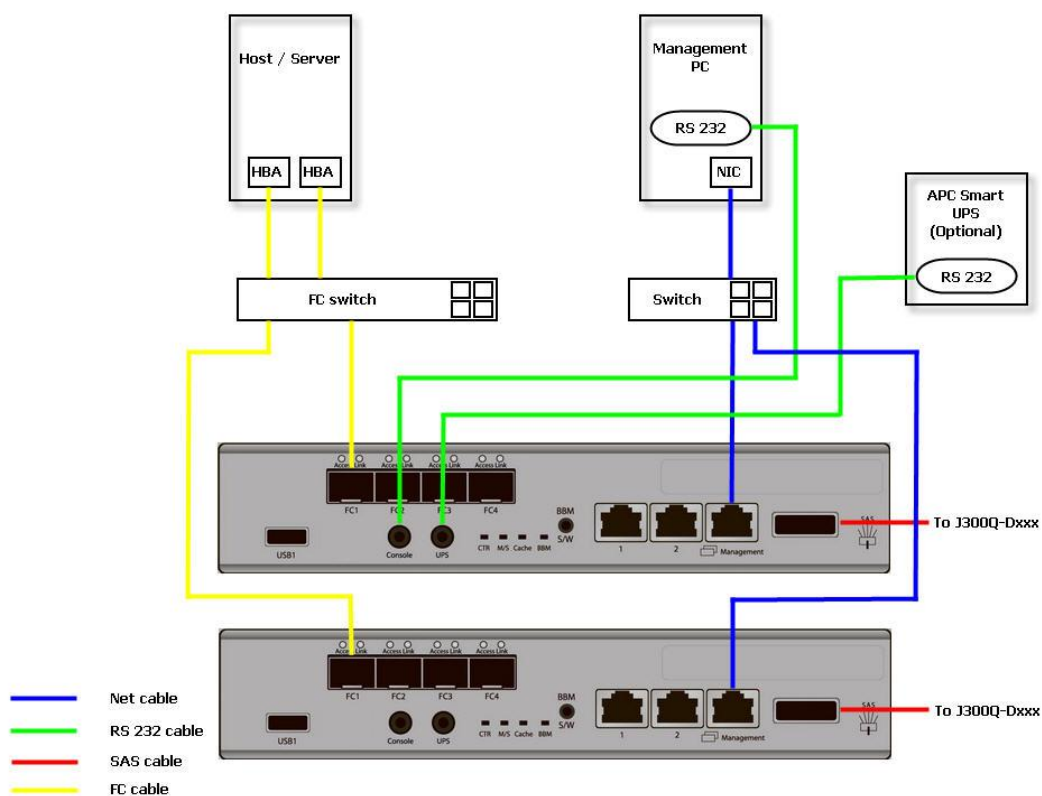
The system is very heavy. It's recommend that a mechanical lifter or at least two persons be used to raise and align the system to prevent injury during installation. Use care when inserting or removing a system into or out of a rack to prevent the accidental tipping or the rack causing damage or personal injury.

- Install the Disk Drives.
- Connect the management port cable and data port cables on the network plan, the topology examples are on the following.

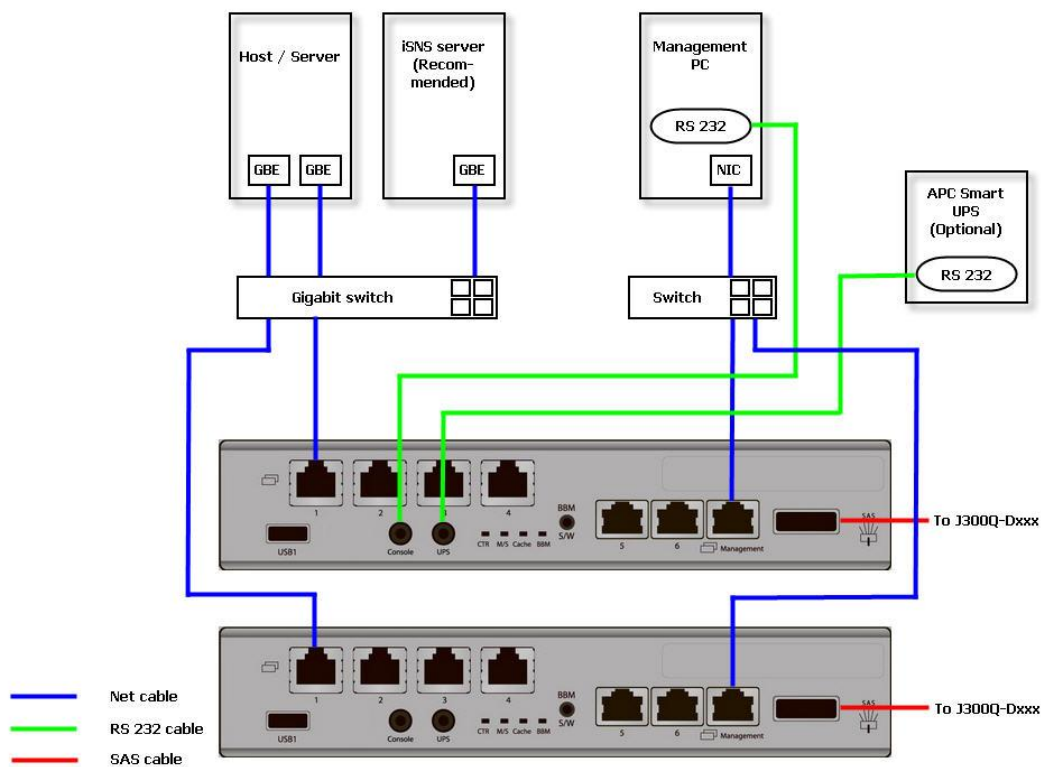
AegisSAN Q500-F20 / Q500-F30:



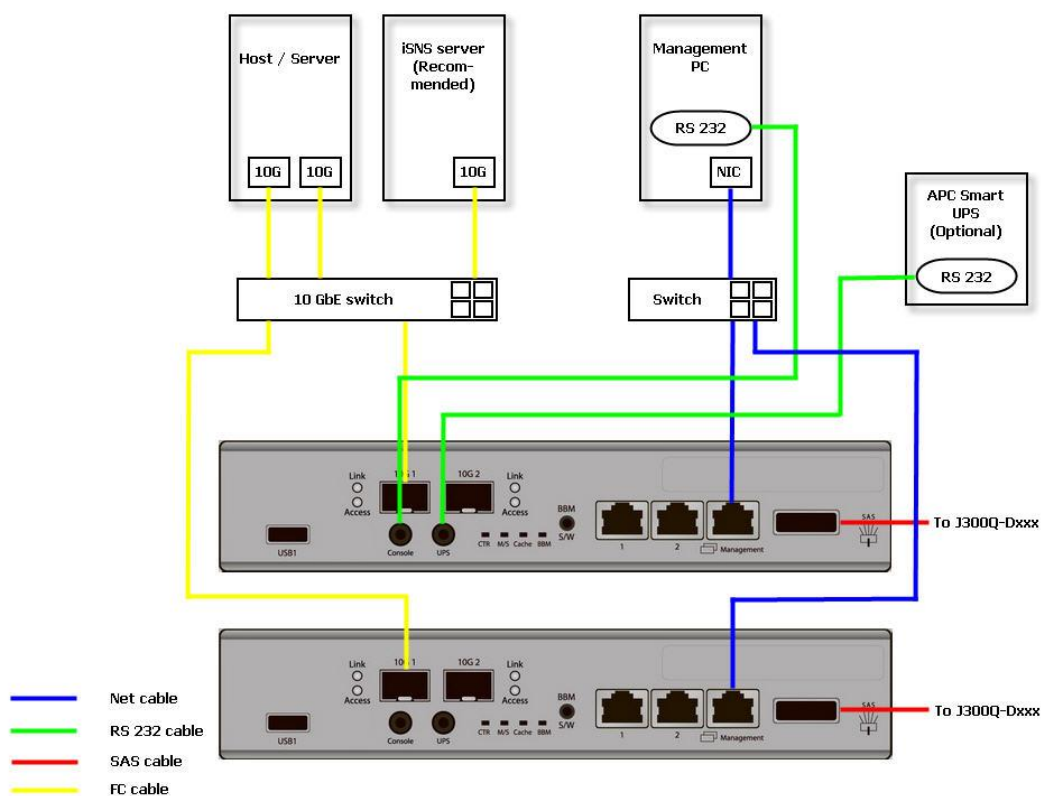
AegisSAN Q500-F21:



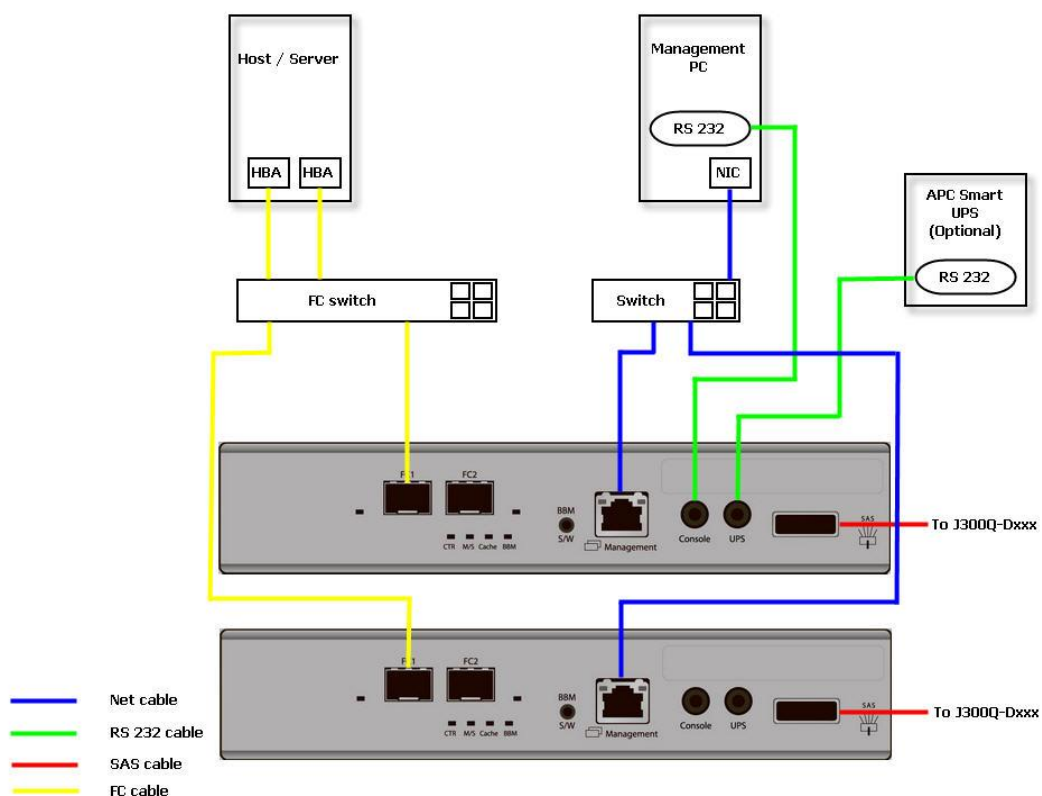
AegisSAN Q500-P10:



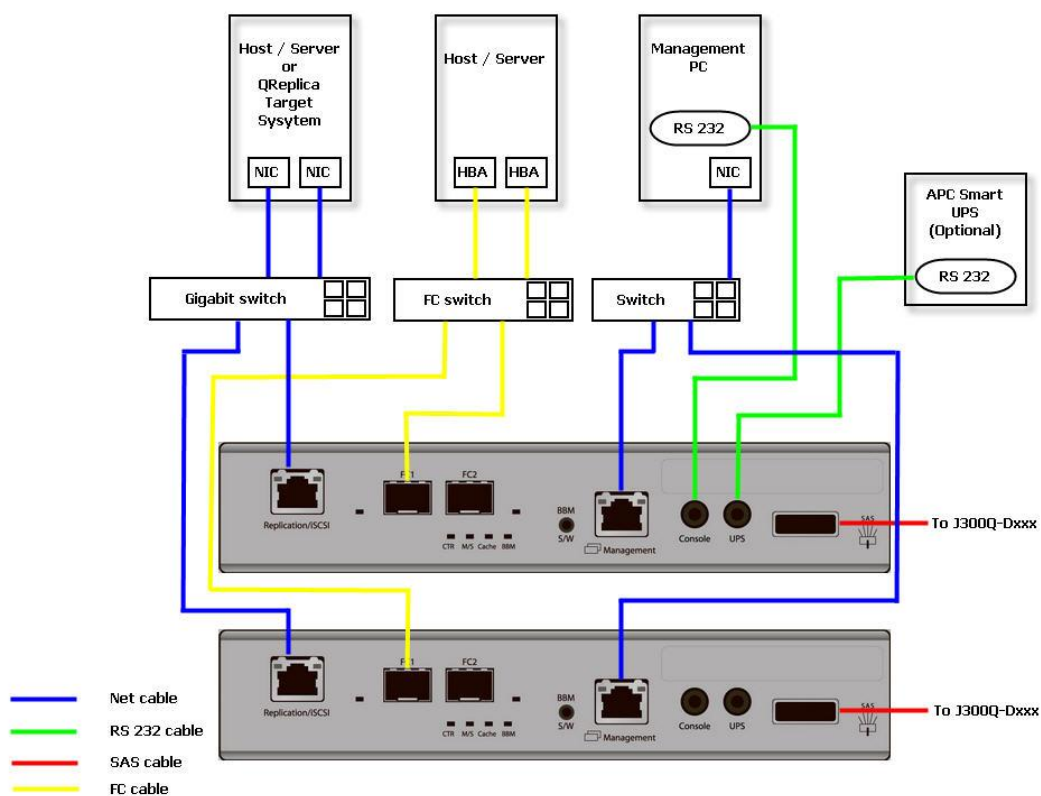
AegisSAN Q500-P20:



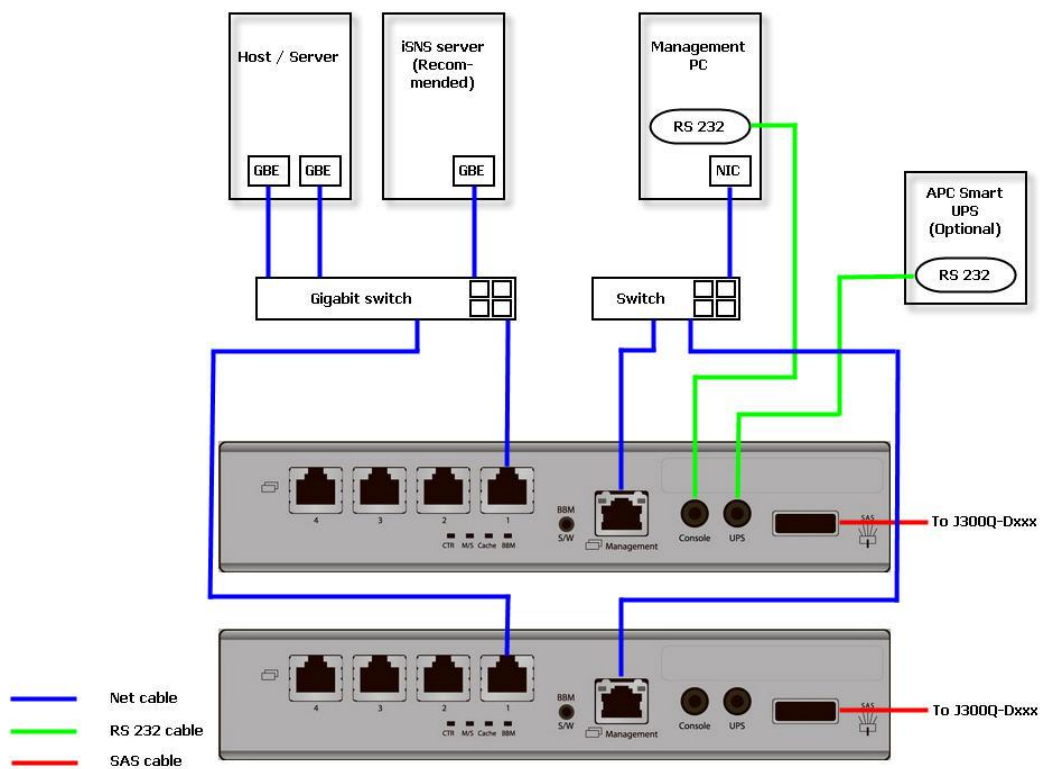
AegisSAN F300Q:



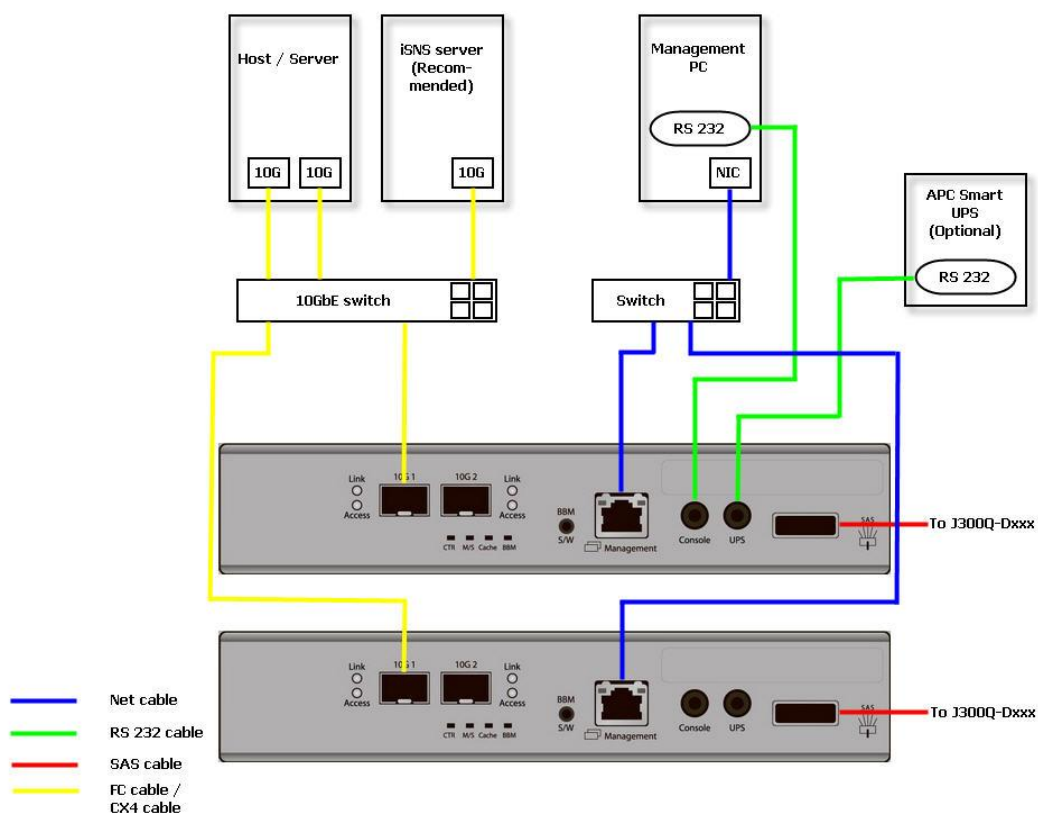
AegisSAN F400Q:



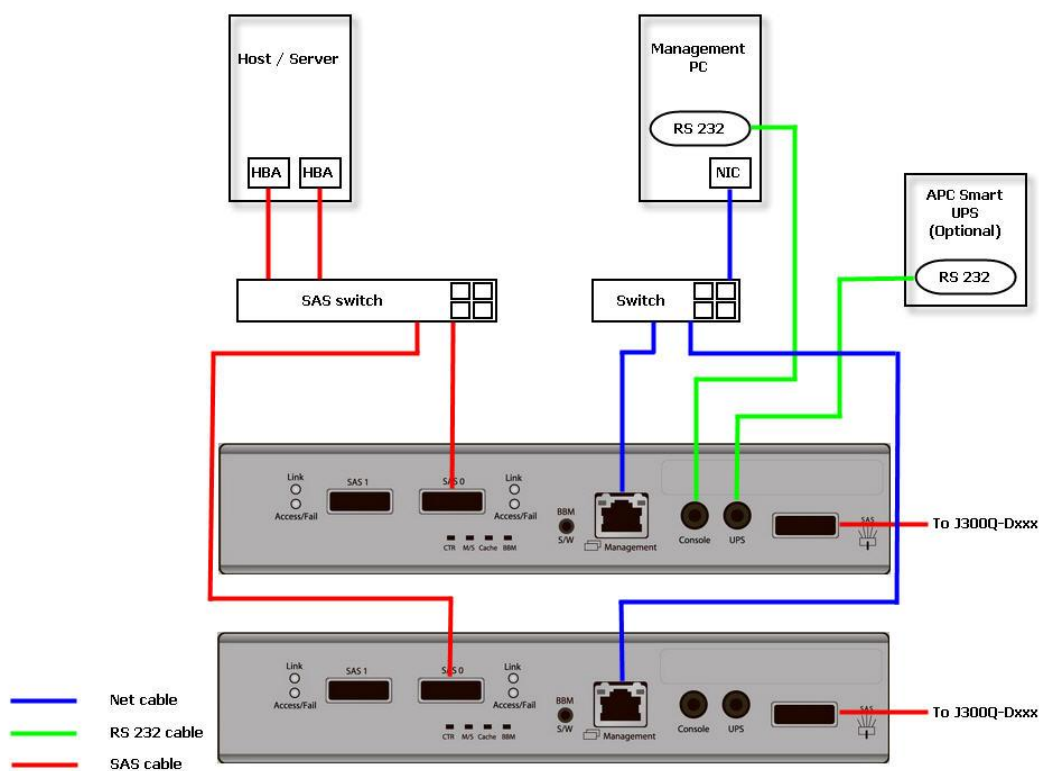
AegisSAN P300Q:



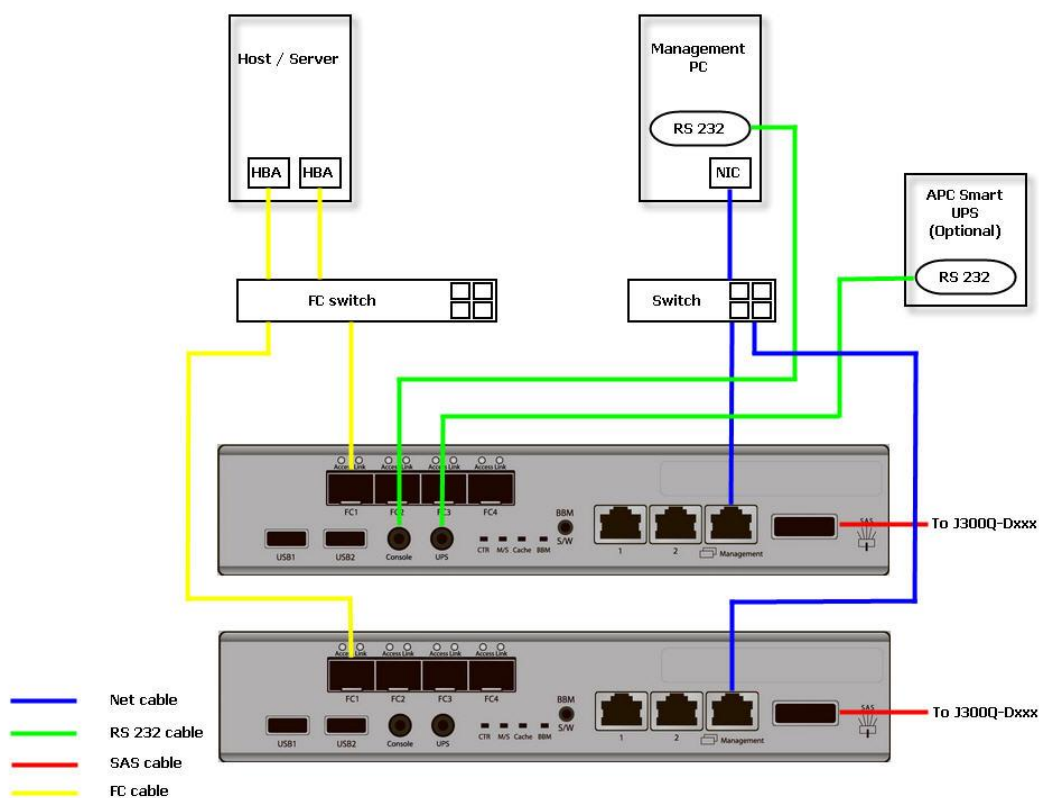
AegisSAN P500Q:



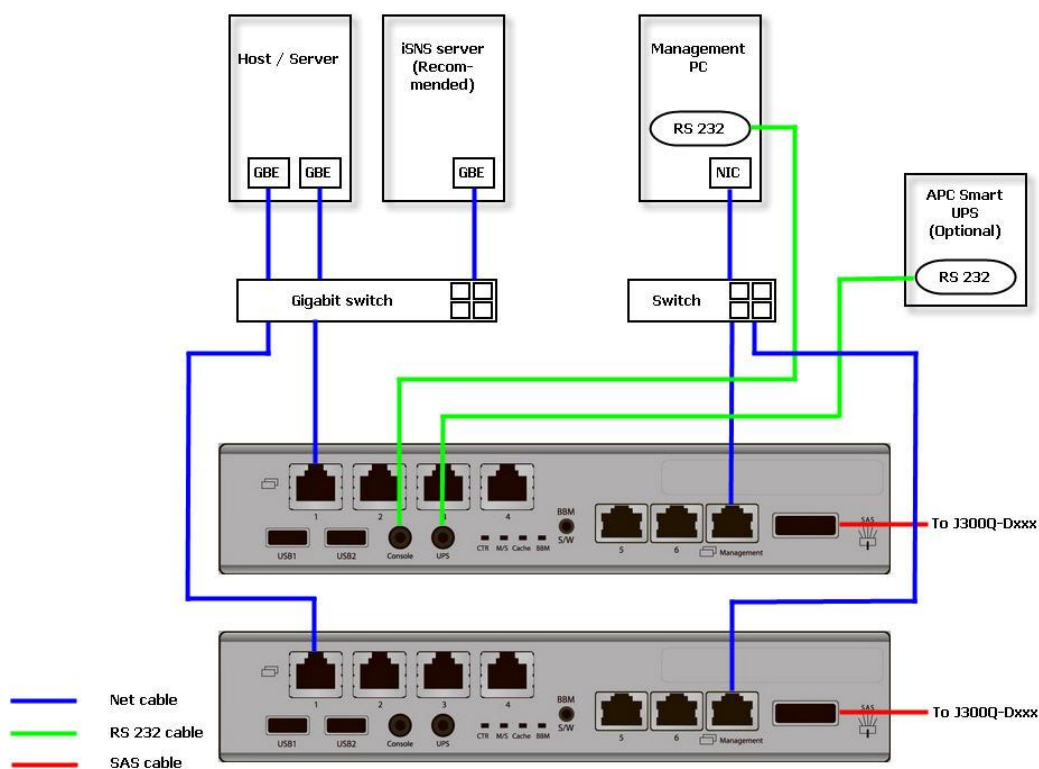
AegisSAN S300Q:



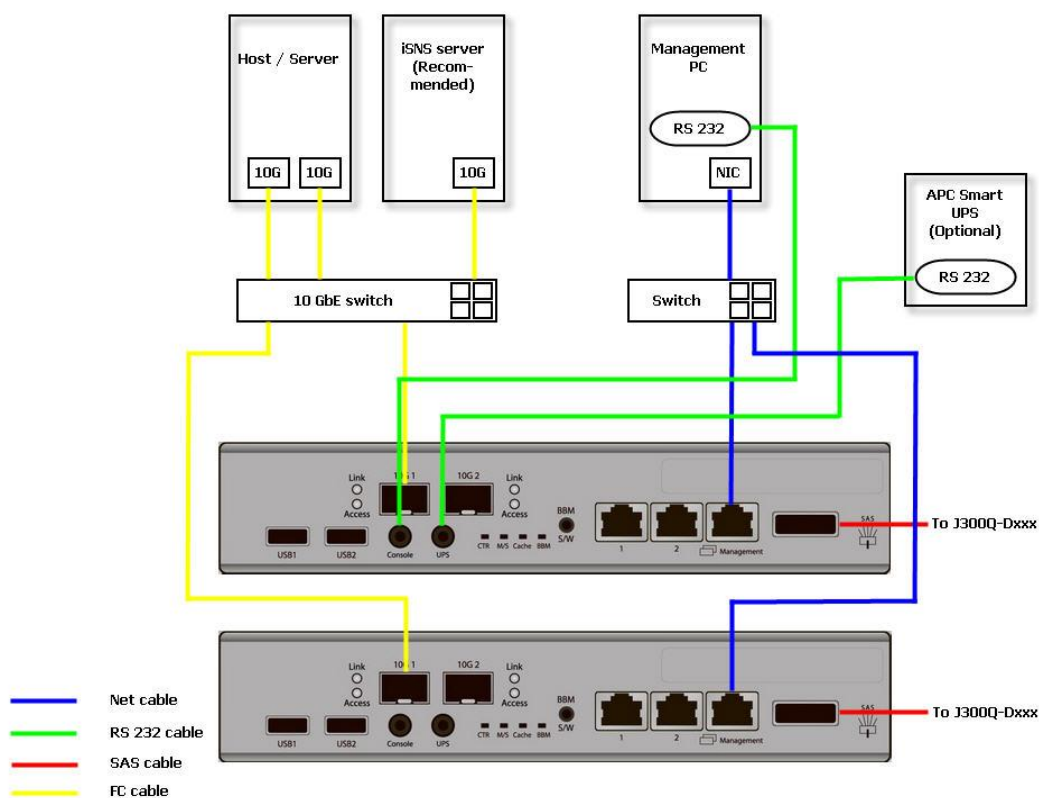
AegisSAN LX F600Q:



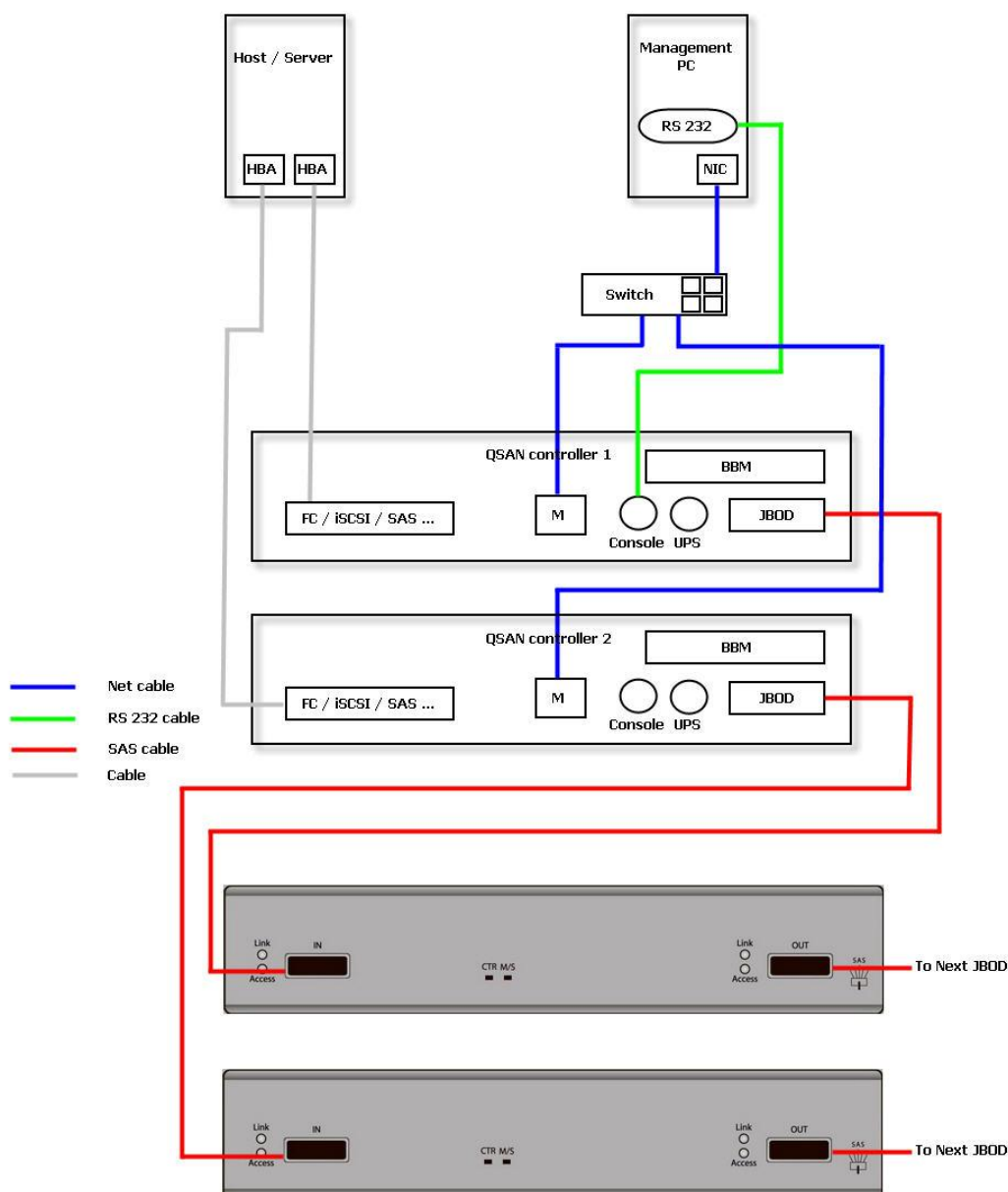
AegisSAN LX P400Q:



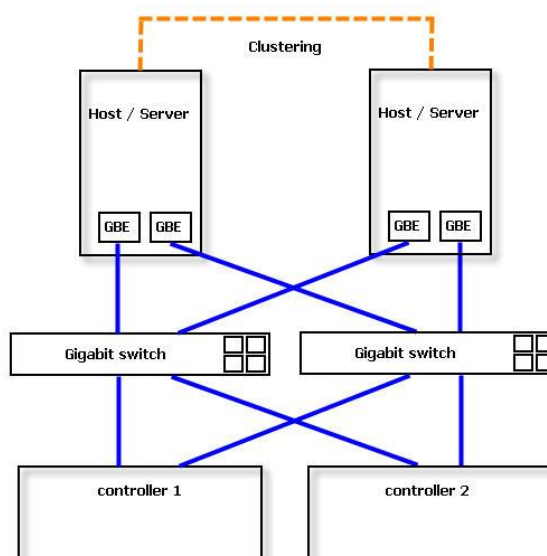
AegisSAN LX P600Q:



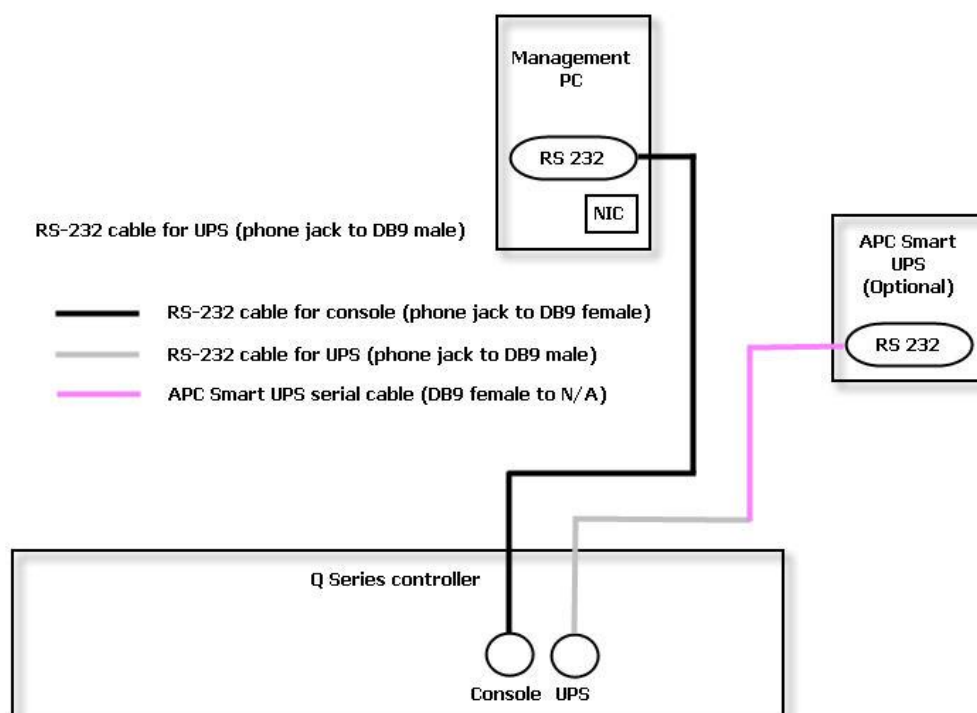
JBOD J300Q:



- For a better data service availability, all the connections among hosts, switches, and the dual controllers are recommended as redundant as below. The following example shows the P300Q-Dxxx series.



- Connect the console cable and UPS as the following.



- Using RS-232 cable for console (back color, phone jack to DB9 female) to connect from controller to management PC directly.
- Using RS-232 cable for UPS (gray color, phone jack to DB9 male) to connect from controller to APC Smart UPS serial cable (DB9 female side), and then connect the serial cable to APC Smart UPS.

**CAUTION:**

It may not work when connecting the RS-232 cable for UPS (gray color, phone jack to DB9 male) to APC Smart UPS directly.

- Attach the power cords and power on the system, and then power on the hosts and the iSNS server (optional for iSCSI environment).
- Start the configuration.

Power ON / OFF

Power on the System

Q212 / Q224 / Q316 / Q424:

The power switch is located at the rear of the panel. To turn on the system, you may press power switch to “|”. After you turn the power ON, the system performs a booting process which takes a few minutes.

Q500:

The power button is located at the right front handle. There are 3 modes.

1. Power on : press once
2. Forced shutdown: press and hold for more than 4 seconds. The power will be cut off immediately.
3. Graceful shutdown: press one to initialize graceful shutdown. Press 2nd time within 4 seconds to confirm and start graceful shutdown. If there is no 2nd press within 4 seconds, disable graceful shutdown and return to normal operating mode.

**CAUTION:**

Be aware that when Controller Health LED is in RED, please DO NOT unplug the controller from the system or turn off the power suddenly. This may cause unrecoverable damage, which will not be covered by warranty.

Power off the System

If it becomes necessary to power down the system, it is recommended using a normal, controlled shutdown form through either the LCM or Web UI to ensure all data is flushed from the cache first.

Shutdown using LCM

At the LCM:

- Power off the system using a normal shutdown.
 - Press **ENT** button.
 - Press ▼ (down) twice to show “Reboot/Shutdown”, and press **ENT** button.
 - Press ▼ (down) once to show “Shutdown”, and press **ENT** button.
 - Press ▲ (up) once to highlight “Yes”, and press **ENT** button.
- System shutdown begins.
- When the “System Shutdown” message is displayed, turn the power switch to OFF “O”.

Shutdown using Web UI

Using the Web UI:

- Select **System Maintenance -> Reboot and Shutdown**.
- Click the **Shutdown** icon.
- When the “System Shutdown” message is displayed on the LCM, turn the power switch to OFF “O”.

3

Quick Setup

Management Interfaces

There are several management methods to manage the storage system, described on the following.

Serial Console

Use console cable (NULL modem cable) to connect from console port of the storage system to RS 232 port of the management PC. The console settings are on the following:

- Baud rate: 115200, 8 data bit, no parity, 1 stop bit, and no flow control.
- Terminal type: vt100

The initial defaults for administrator login are:

- User name: admin
- Password: 1234

Secure Shell Remote Access

SSH (secure shell) software is required for remote login. The SSH client software is available at the following web site:

- SSH Tectia Client: <http://www.ssh.com/>
- PuTTY: <http://www.chiark.greenend.org.uk/>

The default IP setting is DHCP, check the LCM to find the IP address. If your network does not have DHCP server, you will need to configure a static IP address. The remote control settings are on the following:

- Host IP: <IP Address> (e.g.: 192.168.10.50)
- User name: admin
- Password: 1234

**TIP:**

Qsan system supports SSH for remote access only. When using SSH, the IP address and password are required for login.

LCM

After booting up the system, the following screen shows management port IP and model name. Take an example of P300Q-D424.

```
192.168.10.50
Qsan P300Q-D424 ←
```

To access the LCM options, use the **ENT** (Enter) button, **ESC** (Escape) button, **▲** (up) and **▼** (down) to scroll through the functions.

This table describes the function of each item.

Function	Description
System Info.	Display system information including firmware version and amount of RAM.
Alarm Mute	Mutes an alarm after an error occurs.
Reset/Shutdown	Reset or shutdown the system.
Quick Install	Provide quick steps to create a volume.
Volume Wizard	Provide smart steps to create a volume.
View IP Setting	Display current IP address, subnet mask, and gateway.
Change IP config	Set IP address, subnet mask, and gateway. There are 2 options: DHCP (Get IP address from DHCP server) or static IP.
Enc. Management	Shows the enclosure data for physical disk temperatures, fan status, and power supply status.
Reset to Default	Reset the system to default settings. The default resets include: <ul style="list-style-type: none"> Admin password: 1234 IP address: DHCP

WARNING or ERROR events displayed on the LCM are automatically filtered by the LCM default filter. The filter setting can be changed in the Web UI under **System configuration -> Notification setting**.

This table displays the LCM menu hierarchy.

Main	L1	L2	L3	L4	L5
<IP Addr> Qsan <Model> ▲▼	System Info.	Firmware Version <n.n.n>			
		RAM Size <nnnn> MB			
	Alarm Mute	▲Yes No▼			
	Reset/ Shutdown	Reset	▲Yes No▼		
		Shutdown	▲Yes No▼		
	Quick Install (only available if not already set)	<RAID 0 RAID 1 RAID 3 RAID 5 RAID 6 RAID 0+1> nnn GB	Apply The Config	▲Yes No▼	
		Local <RAID 0 RAID 1 RAID 3 RAID 5 RAID 6 RAID 0+1>	Use default algorithm	Volume Size <nnn> GB	Apply The Config ▲Yes No▼
		JBOD <n> ▲▼ <RAID 0 RAID 1 RAID 3 RAID 5 RAID 6 RAID 0+1>	New n disk ▲▼ <nnn> GB	Adjust Volume Size	Apply The Config ▲Yes No▼
		IP Config <Static IP / DHCP / BOOTP>			
		IP Address <192.168.010.050>			
	View IP Setting	IP Subnet Mask <255.255.255.0>			
		IP Gateway <192.168.010.254>			
		DHCP	▲Yes No▼		
		BOOTP	▲Yes No▼		
	Change IP Config	Static IP	IP Address	Adjust IP address	
			IP Subnet Mask	Adjust Submask IP	
			IP Gateway	Adjust Gateway IP	
			Apply IP Setting	▲Yes No▼	
	Enc. Management	Phy. Disk Temp.	Local Slot <n>: <nn> (C)		
		Cooling	Local FAN<n>: <nnnnn> RPM		
		Power Supply	Local PSU<n>: <status>		
	Reset to Default	▲Yes No▼			



CAUTION:

To prevent data loss, when powering down the storage system, it is recommended to execute **Reset/Shutdown -> Shutdown -> Yes** to flush the data from the cache to the physical disks.

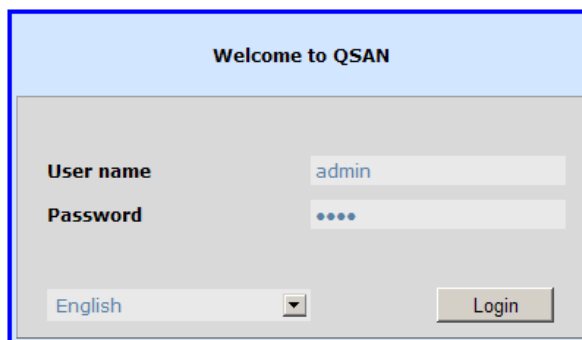
Web UI

For remote management, Qsan storage system uses a web graphic user interface to operate. It supports most common web browsers. Be sure to connect the LAN cable to the management port of the Qsan storage system.

The default IP setting is DHCP; check the LCM to find the IP address. If your network does not have DHCP server, you will need to configure a static IP address.

Enter the IP address into your browser to display the authentication screen.

`http://<IP Address>` (e.g.: `http://192.168.10.50`)



The image shows a web browser window displaying the Qsan Web UI login page. The page has a light blue header with the text "Welcome to QSAN". Below the header is a grey login form. The form contains two input fields: "User name" with the text "admin" and "Password" with four dots. At the bottom left of the form is a language dropdown menu set to "English". At the bottom right is a "Login" button.

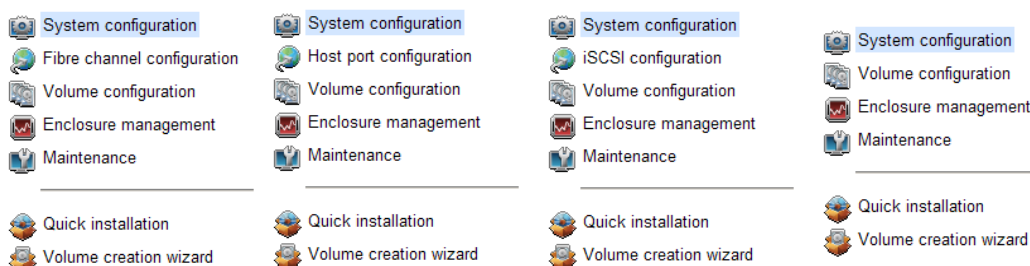
To access the Web UI, you have to enter a user name and password. The initial defaults for administrator login are:

- User name: admin
- Password: 1234

When the password has been verified, the home page is displayed. The following examples show the P300Q-D316.



Choose the functions from the Menu Bar on the left side of the window to make any configuration changes.




















TIP:

The Fibre channel configuration menu bar option is only visible when the controller has FC ports. The Host port configuration menu bar option is only visible when the controller has multiple interfaces. The iSCSI configuration menu bar option is only visible when the controller has iSCSI ports.

There are up to seven indicators and three icons at the top-right corner. The last indicator (Dual controller) is only visible when two controllers are installed.



Icon	Description
 	RAID indicator: <ul style="list-style-type: none"> Green: All RAID groups are functioning. Red: A RAID group is degraded or has failed.
 	Temperature indicator: <ul style="list-style-type: none"> Green: Temperature is normal. Red: Temperature is too high.
 	Voltage indicator: <ul style="list-style-type: none"> Green: Voltage values are normal. Red: Voltage values are out of range.
 	UPS indicator: <ul style="list-style-type: none"> Green: UPS is functioning or no UPS is connected. Red: UPS connection has failed.
 	Fan indicator: <ul style="list-style-type: none"> Green: Fan is working well. Red: Fan failed.
 	Power indicator: <ul style="list-style-type: none"> Green: Power supplies are connected and working well. Red: A power supply has failed or is no longer connected.
 	Dual controller indicator: <ul style="list-style-type: none"> Green: Dual controllers are active and working well. Orange: One of the dual controllers has failed.
	Return to home page.
	Logout of the management web UI.
	Mute alarm beeper.

This table describes the indicators and icons.



TIP:

If the status indicators in Internet Explorer (IE) are displayed in gray, but not in blinking red, please enable **Tools -> Internet Options -> Advanced -> Play animations in webpages** options in IE. The default value is enabled, but some applications disable it.

How to Use the Guided Configurations

To help users get started quickly, two guided configuration tools are available in the Web UI and LCM. **Quick installation** guides you a easy way to create a volume. **Volume creation wizard** provides a smarter policy to help users to create a volume. If you are an advanced user, you can skip these steps.

Quick Installation Tool

This tool guides you through the process of setting up basic array information, configuring network settings, and the creation of a volume on the storage system. Please make sure that it has some free hard drives installed in the system. SAS drivers are recommended.

Physical disk													
RAID group													
Virtual disk													
Snapshot													
Logical unit													
Show PD for: Local Show size unit as: GB													
	Slot	Size(GB)	RG	Status	Health	Usage	Vendor	Serial	Type	Write cache	Standby	Readahead	Command queuing
OP	1	465		Online	Good	Free disk	SEAGATE	9QMBKDVV00009941MZUJ	SAS	Enabled	Disabled	Enabled	Enabled
OP	2	465		Online	Good	Free disk	SEAGATE	9QMBHBL9000099445BRN	SAS	Enabled	Disabled	Enabled	Enabled
OP	3	465		Online	Good	Free disk	SEAGATE	9QMBKE0P000099445B6Q	SAS	Enabled	Disabled	Enabled	Enabled
OP	4	465		Online	Good	Free disk	SEAGATE	9QMBKE4F000099445E36	SAS	Enabled	Disabled	Enabled	Enabled
OP	5	465		Online	Good	Free disk	SEAGATE	9QMBKE1R000099445E4T	SAS	Enabled	Disabled	Enabled	Enabled
OP	6	465		Online	Good	Free disk	SEAGATE	9QMBKDZF000099445E9B	SAS	Enabled	Disabled	Enabled	Enabled
OP	7	465		Online	Good	Free disk	SEAGATE	9QMBKDSV000099445BSS	SAS	Enabled	Disabled	Enabled	Enabled
OP	8	465		Online	Good	Free disk	SEAGATE	9QM4AF2G00009845VWF8T	SAS	Enabled	Disabled	Enabled	Enabled

1. Click **Quick installation** from the menu bar.
2. Enter a **System name** and set up the **Date and time**. Click **Next** button to proceed.

Quick installation

Step 1 : System setting

System name

System name : QSAN

Date and time

☐ Change date and time

Current time : 2009/8/12 0:0:1

Time zone : (GMT+08:00) Taipei

☒ Setup date and time manually

Date : 2009 / 8 / 12

Time : 0 : 0 : 0

☐ NTP

Server :

Cancel

Next >>

3. Confirm or change the management port IP address and DNS server. If you don't want to use the default DHCP setting, choose either BOOTP or specify a Static IP address. If the default HTTP, HTTPS, and SSh port numbers are not allowed on your network, they can be changed here as well.

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Quick installation

Step 2 : Network setting

MAC address

MAC address : 00:13:78:B9:00:50

Address

☒ DHCP
☐ BOOTP
☐ Static

Address : 192.168.0.1
Mask : 255.255.255.0
Gateway : 192.168.0.254

DNS

DNS :

Port

HTTP port : 80
HTTPS port : 443
SSH port : 22

Cancel << Back Next >>

- For iSCSI configurations, use this step to set up the data port iSCSI IP address, and then click **Next** button.

Quick installation

Step 3 : iSCSI IP address

LAN1:

☐ DHCP
☒ Static

Address : 192.168.1.1
Mask : 255.255.255.0
Gateway : 192.168.1.254

Cancel << Back Next >>

- Choose a RAID level and volume size. This step utilizes all drives in the storage system as well as any JBOD expansion arrays present. This option allows the selection of the RAID type and the number of drives in each array.

Quick installation

Step 4 : Volume setting

RAID level :

- RAID 0(3724 GB) -
- RAID 0(3724 GB) -
- RAID 1(465 GB) -
- RAID 3(3258 GB) -
- RAID 5(3258 GB) -
- RAID 6(2793 GB) -
- RAID 0+1(1862 GB) -

Cancel << Back Next >>

6. Verify all items, and then click **Finish** button to complete the quick installation.

Quick installation

Confirm

System name
System name : QSAN

Network setting
Address : DHCP
DNS :
HTTP port : 80, HTTPS port : 443, SSH port : 22

iSCSI IP address
Address : 192.168.1.1
Mask : 255.255.255.0
Gateway : 192.168.1.254

Volume setting
RAID level : RAID 0 on Local enclosure
Volume size (GB) : 3724

Cancel << Back Finish

The iSCSI information is only displayed when iSCSI controllers are used. Use **Back** button to return to a previous page to change any setting.

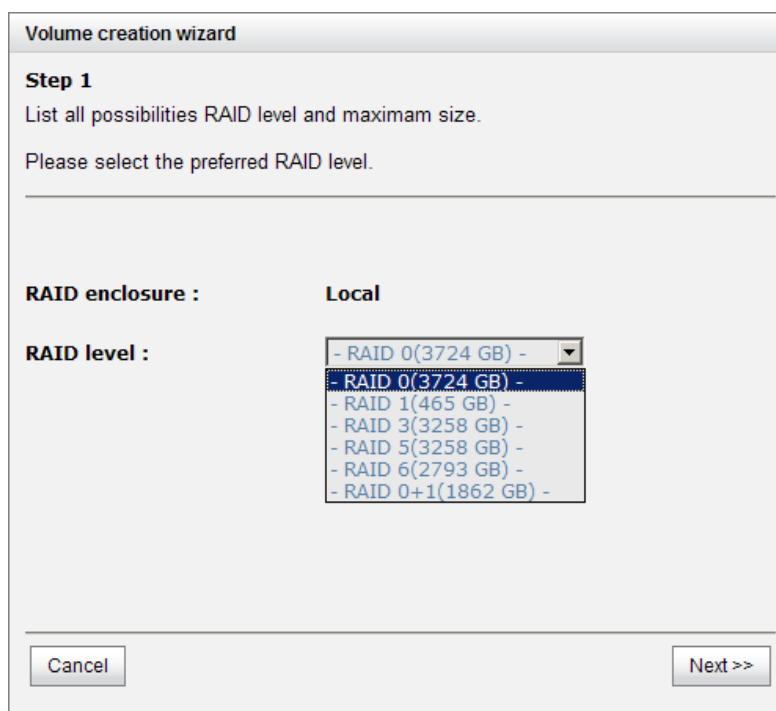
Volume Creation Wizard

The **Volume creation wizard** provides a smarter policy to determine all possibilities and volume sizes in the different RAID levels that can be created using the existing free drives. It provides:

- Largest capacity for each RAID level from which to choose.
- The fewest number of drives for each RAID level / volume size.

This way, after choosing RAID level, you may find that some drives are still available (free status). This phenomenon is the result of using smart design. Take an example, user chooses the RAID 5 level and the system has 12*200GB + 4*80GB free drives inserted. Generally, if using all 16 drives for a RAID 5 group, the maximum size of volume is $(16-1)*80\text{GB} = 1200\text{GB}$. This wizard provides a smarter check and searches the most efficient way of using free drives. It uses 200GB drives only to provide $(12-1)*200\text{GB} = 2200\text{GB}$ capacity, the volume size is larger and less drives.

1. Click **Volume create wizard** from the menu bar.
2. Choose the RAID level. The number in the brackets is the maximum capacity at the RAID level.



The screenshot shows a dialog box titled "Volume creation wizard" with a tab labeled "Step 1". The text inside says: "List all possibilities RAID level and maximam size." and "Please select the preferred RAID level." Below this, there are two labels: "RAID enclosure :" and "RAID level :". The "RAID enclosure :" label is followed by the text "Local". The "RAID level :" label is followed by a drop-down menu. The drop-down menu is open, showing a list of RAID options with their corresponding maximum capacities in GB: "- RAID 0(3724 GB) -", "- RAID 0(3724 GB) -", "- RAID 1(465 GB) -", "- RAID 3(3258 GB) -", "- RAID 5(3258 GB) -", "- RAID 6(2793 GB) -", and "- RAID 0+1(1862 GB) -". At the bottom of the dialog box, there are two buttons: "Cancel" and "Next >>".

3. From the drop-down list, select either the RAID group capacity combination desired or the **Use default algorithm** option for maximum RAID group capacity. Click **Next** button to proceed.

Volume creation wizard

Step 2

Choose default algorithm for maximum RG capacity.
Possible combinations for the preferred RAID level are listed, check 'Customization' to choose the preferred option.

Hint: Maximum physical disks for one RG is 32.

☐ Use default algorithm

☒ Customization

RAID group :

- new 1 disk (465 GB) -

- new 1 disk (465 GB) -

- new 2 disk (931 GB) -

- new 3 disk (1396 GB) -

- new 4 disk (1862 GB) -

- new 5 disk (2327 GB) -

- new 6 disk (2793 GB) -

- new 7 disk (3258 GB) -

- new 8 disk (3724 GB) -

Cancel

Back

Next >>

- Enter the virtual disk size desired that is less than or equal to the default available size shown. Then click **Next** button.

Volume creation wizard

Step 3

Decide VD size.
Enter a number less or equal to the default number.

Volume size (GB) :

1862

- Finally, verify the selections and click **Finish** button if they are correct.

The volume is created and named by the system automatically. It is now available to use.

	Name	Size(GB)	Write	Priority	Bg rate	Type	Clone	Schedule	Status	Health	R %	RAID	#LUN	Snapshot space(GB)	#Snapshot	RG
OP	QUICK71147	1862	WB	HI	4	RAID	N/A	N/A	Online	Optimal		RAID 0	1	0/0	0	QUICK42321

4

Basic Configuration

Interface Hierarchy

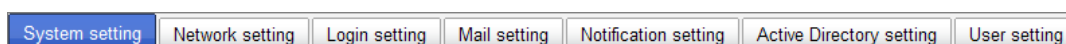
This table describes the hierarchy of the web GUI.

Menu Bar	L1	L2, Button or Menu
System configuration	System setting	System name / Date and time / System indication
	Network setting	MAC address / Address / DNS / Port
	Login setting	Login configuration / Admin password / User password
	Mail setting	Mail / Send test mail
	Notification setting	SNMP / Messenger / System log server / Event log filter / Buzzer
	Active Directory setting	AD domain / AD server
	User setting	Create Options: Change password / Delete
iSCSI configuration (This option is only visible when the controller has iSCSI ports.)	NIC	Show information for: < <u>Controller 1</u> Controller 2 > Options: Link aggregation / set VLAN ID / IP settings for iSCSI ports / Become default gateway / Enable jumbo frame / Ping host Visible at the last iSCSI port: Enable QReplica / QReplica IP setting / Disable QReplica
	Entity property	Entity name / iSNS IP
Host configuration (This option is only visible when the controller has multiple interfaces.)	Node	Show information for: < <u>Controller 1</u> Controller 2 > Options: Authenticate / Change portal / Rename alias / User
	Session	Show information for: < <u>Controller 1</u> Controller 2 > List connection / Delete
	CHAP account	Create Options: Modify user information / Delete
Fibre channel configuration (This option is only visible when the controller has FC ports.)	Fibre channel (This option is only visible when the controller has FC ports.)	Show information for: < <u>Controller 1</u> Controller 2 > Options: Change Link speed
Volume configuration	Physical disk	Show PD for: < <u>-Local-</u> -JBODn- > Show size unit as: < <u>(GB)</u> (MB) > Disk Health Check / Disk Check Report Options: Set Free disk / Set Global spare / Set Dedicated spare / Upgrade / Disk Scrub / Turn on/off the indication LED / More information
	RAID group	Create Options: Migrate / Move / Activate / Deactivate / Parity check / Delete / Set preferred owner / Set disk property / Add RAID set / Add policy / More information RAID Set options: Remove / Move / List PD RAID Group Policy options: Delete / Modify
	Virtual disk	Create / Configuration Options: Extend / Parity check / Delete / Set property / Space Reclamation / Attach LUN / Detach LUN / List LUN / Set clone / Clear clone / Start clone / Stop clone / Schedule clone / Set snapshot space / Cleanup snapshot / Take snapshot / Auto snapshot / List snapshot /

		More information
	Snapshot	Set snapshot space / Auto snapshot / Take snapshot / Cleanup snapshot Options: Export / Rollback / Delete
	Logical unit	Attach Options: Detach/ Session
	QReplica (<i>This option is only visible when the QReplica is enabled.</i>)	Create / Rebuild / Configuration Options: Start / Stop / Refresh / Create multi-path / Delete multi-path / Schedule / Delete
	Enclosure management	
	Hardware monitor	Show information for: < -Local- -JBODn- > Temperature: < (C) / (F) > Controller 1 / BPL / Controller 2 Options: Auto shutdown
	UPS	UPS Type / Shutdown battery level / Shutdown delay / Shutdown UPS / Status / Battery level
	SES	Enable Options: Disable
	S.M.A.R.T.	Show information for: < -Local- -JBODn- > Temperature: < (C) / (F) > S.M.A.R.T. information
Maintenance	System information	System information table
	SAS topology (<i>This option is only visible in SAS front-end models.</i>)	SAS topology
	Event log	Event log level to show: < INFO WARNING ERROR > Download / Mute / Clear
	Upgrade	RAID controller/System(s) / JBOD controller/System(s) < -JBODn- > / Controller Mode / QReplica license
	Firmware synchronization (<i>This option is only visible when dual controllers are inserted.</i>)	Synchronize the slave controller's firmware version with the master's.
	Reset to factory default	Confirm
	Import and export	Import/Export / Import file
	Reboot and shutdown	Reboot / Shutdown Reboot options: Both Controller 1 and Controller 2 / Controller 1 / Controller 2
Quick installation		Step 1 / Step 2 / Step 3 / Step 4 / Confirm
Volume creation wizard		Step 1 / Step 2 / Step 3 / Confirm

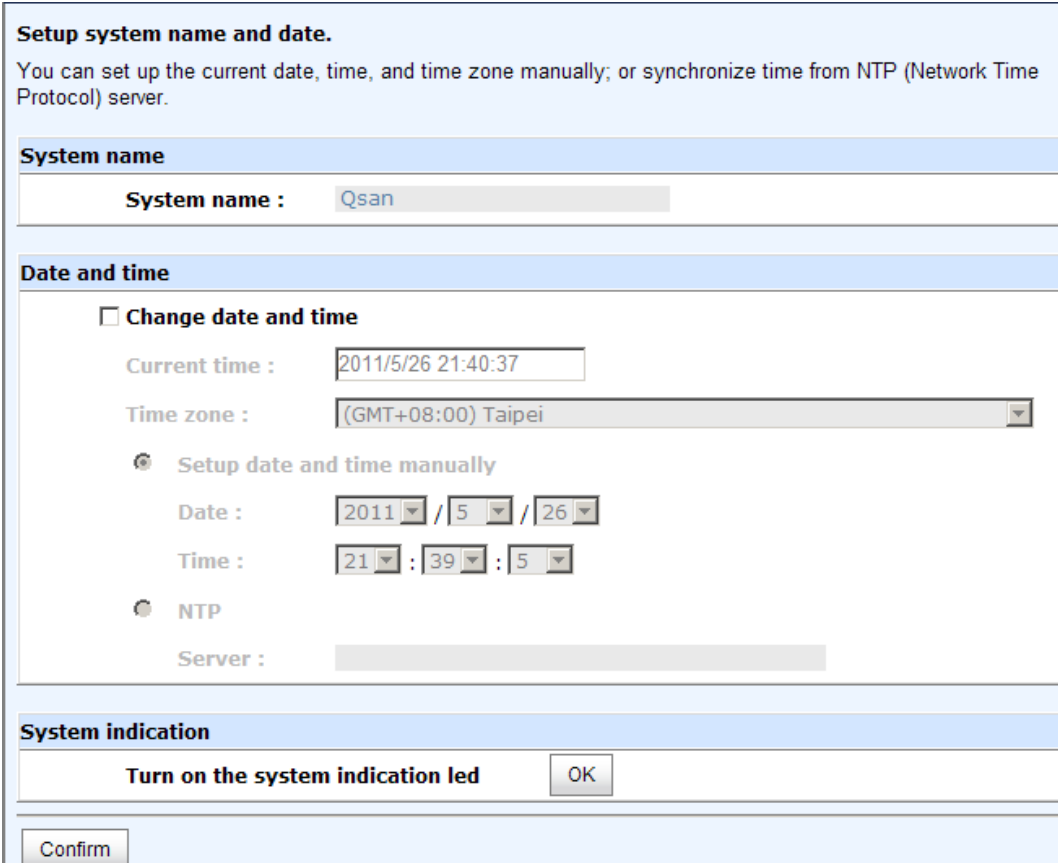
System Configuration

The **System configuration** menu option is for accessing the **System setting**, **Network setting**, **Login setting**, **Mail setting**, **Notification setting**, **Active Directory setting** and **User setting** option tabs.



System Setting

The **System setting** tab is used to setup the system name and date. The default system name is composed of the model name and the serial number of this system.



The screenshot shows the 'System Setting' web interface. At the top, a header reads 'Setup system name and date.' followed by a sub-header 'System name' and a text input field containing 'Qsan'. Below this is a 'Date and time' section with a checkbox 'Change date and time' which is unchecked. Under this checkbox, there are two options: 'Setup date and time manually' (selected with a radio button) and 'NTP' (unselected). The 'Setup date and time manually' option includes fields for 'Current time' (2011/5/26 21:40:37), 'Time zone' (GMT+08:00 Taipei), 'Date' (2011 / 5 / 26), and 'Time' (21 : 39 : 5). The 'NTP' option includes a 'Server' text input field. At the bottom of the form is a 'System indication' section with a checkbox 'Turn on the system indication led' and an 'OK' button. A 'Confirm' button is located at the very bottom of the interface.

The options are available on this tab:

- **System name:** To change the **System name**, highlight the old name and type in a new one.
- **Date and time:** To change the current date, time and time zone settings, check **Choose date and time**. The changes can be done manually or synchronized from an NTP (Network Time Protocol) server.
- **System indication:** To **Turn on the system indication led** for locating this system in the racks, click **OK** button. And click it again to turn off.

When it is done, click **Confirm** button.

Network Setting

The **Network setting** tab is used to view the MAC address and change basic network settings.

Setup MAC, address, DNS and ports.
 You can check 'DHCP' to acquire IP address from DHCP server, or check 'Static' to setup IP address.

MAC address	
MAC address :	00:13:78:B9:00:50

Address	
<input checked="" type="radio"/> DHCP	
<input type="radio"/> BOOTP	
<input type="radio"/> Static	
Address :	192.168.0.1
Mask :	255.255.255.0
Gateway :	192.168.0.254

DNS	
DNS :	

Port	
HTTP port :	80
HTTPS port :	443
SSH port :	22

Confirm

The options are available on this tab:

- **Address:** The option can change IP address for remote administration usage. There are three options: **DHCP**, **BOOTP** and specify a **Static** IP address. The default setting is DHCP.
- **DNS:** If necessary, the IP address of DNS server can be entered or changed here.
- **Port:** If the default port numbers of HTTP, HTTPS and SSH are not allowed on the network, they can be changed here.

When it is done, click **Confirm** button.

Login Setting

The **Login setting** tab is used to control access to the storage system. Use it to set an auto logout time, to limit access to just one administrator at a time, and to change the Admin and User password.

Setup Login configuration and password.

If Auto logout time is set, the system will log out automatically when user is inactive for a period of time. When the login lock is enabled, the system allows only one user to login or modify system settings.

Login configuration

Auto logout : - Disable -

Login lock : - Disable -

Admin password

☐ **Change admin password**

Old password :

Password :

Confirm :

User password

☐ **Change user password**

Password :

Confirm :

Confirm

The options are available on this tab:

- **Auto logout:** The system logs the user out of the web UI automatically when the user is inactive for the stated period of time. The options are Disable (default), 5 minutes, 30 minutes or 1 hour.
- **Login lock:** When the login lock is enabled, the system allows only one user to login to the web UI at a time. The options are Disable (default) or Enable.
- **Change admin password:** Check it to change administrator password. The maximum length of password is 12 alphanumeric characters.
- **Change user password:** Check it to change user password. The maximum length of password is 12 alphanumeric characters.

When it is done, click **Confirm** button.

Mail Setting

The **Mail setting** tab is used to enter up to three mail addresses for receiving the event notifications. Fill in the necessary fields and click **Send test mail** to test whether it is workable. Some mail servers check the **Mail-from address** and need the SMTP relay setting for authentication.

**TIP:**

Please make sure the DNS server IP is well-setup in **System configuration -> Network setting**. So the event notification mails can be sent successfully.

You can also select which levels of event logs which you would like to receive. The default setting only includes WARNING and ERROR event logs.

Enter at most 3 mail addresses for receiving the event notification. Some mail servers would check 'Mail-from address' and need authentication for anti-spam.
After information is set, you can click 'Send test mail' to test whether email functions are available.

Mail

Mail-from address :

Mail-to address 1 :

Send events1 : ☐ INFO ☒ WARNING ☒ ERROR

Mail-to address 2 :

Send events2 : ☐ INFO ☒ WARNING ☒ ERROR

Mail-to address 3 :

Send events3 : ☐ INFO ☒ WARNING ☒ ERROR

☐ **SMTP relay** ▼

SMTP server :

Authentication :

Account :

Password :

Confirm :

When it is done, click **Confirm** button.

Notification Setting

The **Notification setting** tab is used to setup SNMP traps (for alerting via SNMP), pop-up messages via Windows messenger (not MSN), alerts via the syslog protocol, and the event log filter. The system buzzer is also managed here.

SNMP ▼	
SNMP trap address 1 :	<input type="text"/>
SNMP trap address 2 :	<input type="text"/>
SNMP trap address 3 :	<input type="text"/>
Community :	public
MIB file download :	<input type="button" value="Download"/>
Send events :	<input type="checkbox"/> INFO <input checked="" type="checkbox"/> WARNING <input checked="" type="checkbox"/> ERROR
Messenger ▼	
Messenger IP/Computer name 1 :	<input type="text"/>
Messenger IP/Computer name 2 :	<input type="text"/>
Messenger IP/Computer name 3 :	<input type="text"/>
Send events :	<input type="checkbox"/> INFO <input checked="" type="checkbox"/> WARNING <input checked="" type="checkbox"/> ERROR
System log server ▼	
Server IP/hostname :	<input type="text"/>
UDP Port :	514
Facility :	User ▼
Event level :	<input type="checkbox"/> INFO <input checked="" type="checkbox"/> WARNING <input checked="" type="checkbox"/> ERROR
Event log filter ▼	
Pop up events :	<input type="checkbox"/> INFO <input type="checkbox"/> WARNING <input type="checkbox"/> ERROR
Show on LCM :	<input type="checkbox"/> INFO <input checked="" type="checkbox"/> WARNING <input checked="" type="checkbox"/> ERROR
Buzzer ▼	
Always disable buzzer :	<input type="checkbox"/>
<input type="button" value="Confirm"/>	

The options are available on this tab:

- SNMP:** It allows up to three SNMP trap addresses. The default community setting is public. You can choose the alert levels which you would like to receive. The default setting only includes WARNING and ERROR event logs. If necessary, click **Download** to get MIB file for importing to the SNMP client tool.
 There are many SNMP tools available on the internet.
 - SNMPc: <http://www.snmpc.com/>
 - Net-SNMP: <http://net-snmp.sourceforge.net/>
- Messenger:** You must enable the Messenger service in Windows (**Start -> Control Panel -> Administrative Tools -> Services -> Messenger**). It allows up to three Messenger addresses. You can choose the alert levels which you would like to receive. The default setting only includes WARNING and ERROR event logs.

- **System log server:** Fill in the necessary fields for syslog service. The default port is 514. You can choose the alert levels which you would like to receive. The default setting only includes WARNING and ERROR event logs.

There are some syslog server tools available on the internet for Windows.

- WinSyslog: <http://www.winsyslog.com/>
- Kiwi Syslog Daemon: <http://www.kiwisyslog.com/>

Most UNIX systems build in syslog daemon.

- **Event log filter:** You can choose the alert levels which you would like to have pop-up message in the Web UI and shown on LCM. The default setting for Web UI is none while the default setting for LCM only includes WARNING and ERROR event logs.
- **Buzzer:** Check it to disable the buzzer. Uncheck it to reactivate the buzzer.

When it is done, click **Confirm** button.

Active Directory Setting (Only Available in AegisSAN)

RBAC (Role-Based Access Control) is an approach to restricting system access to authorized users. Qsan storage systems add this feature. The account administrator can create a new account with assigning a role to grant the access right.

This feature is also integrated with Microsoft Active Directory service. It allows users to log on the Qsan storage systems with an account which is created in Microsoft Active Directory. It helps administrators to centralize the access control of the Qsan storage systems without maintaining separate account lists.

To fulfill the feature, there are two tabs added. The **Active Directory setting** tab and the **User setting** tab. The **Active Directory setting** tab is used to setup AD domain and server IP. This table shows the role names, the roles which are mapped to the AD group name and their permissions.

Role Name	AD Group Name	Permissions
admin	Administrators	• Full permissions.
user	Users	• Browse the configurations only. • No permission to change anything.
net	Network Configuration Operators	• Have permission to change Network setting, Mail setting, Notification setting in System configurations . • Have permission to change NIC in iSCSI configurations . (only for iSCSI models.) • No permission to change Volume configurations settings.
data	Server Operators	• Have permission to operate in Volume configurations . • No permission to change System

		configurations settings.
account	Account Operators	<ul style="list-style-type: none"> Have permission to create, modify and delete the accounts, and their permissions. No permission to change admin group.

Active Directory

AD domain :

AD server :

The options are available on this tab:

- AD domain:** Fill in Active Directory domain name.
- AD server:** Fill in Active Directory server IP address.

When it is done, click **Confirm** button.

After the above settings are entered, the login authentication supports Windows Active Directory service. First, you should create an account with an AD group in Windows. And then try to use the account to login the storage system. The syntax of the user name in Active Directory is:

- UPN (User Principal Name) (e.g.: Administrator@qsan.com.tw)

Welcome to Qsan

User name

Password

English

The permission of the account depends on what AD group belongs in Windows.

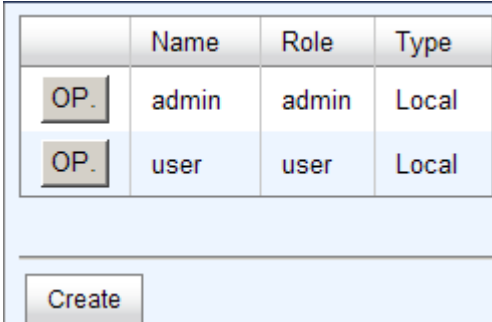
User Setting (Only Available in AegisSAN)

The **User setting** tab is used to manage the local accounts. The username which belongs to the role **admin** or **account** has the permission to create a new account, modify the password or delete the account. This table shows the role names, system default users and their permissions.

Role Name	Default User	Permissions
admin	admin	<ul style="list-style-type: none"> Full permissions.
user	user	<ul style="list-style-type: none"> Browse the configurations only.

		<ul style="list-style-type: none"> No permission to change anything.
net	N/A	<ul style="list-style-type: none"> Have permission to change Network setting, Mail setting, Notification setting in System configurations. Have permission to change NIC in iSCSI configurations. (only for iSCSI models.) No permission to change Volume configurations settings.
data	N/A	<ul style="list-style-type: none"> Have permission to operate in Volume configurations. No permission to change System configurations settings.
account	N/A	<ul style="list-style-type: none"> Have permission to create, modify and delete the accounts, and their permissions. No permission to change admin group.

There are two default users in the system: **admin** and **user**. The username **admin** belongs to the role **admin** which has full permissions and can not be deleted. The other username **user** belongs to the role **user** which has read-only permissions.



	Name	Role	Type
OP.	admin	admin	Local
OP.	user	user	Local

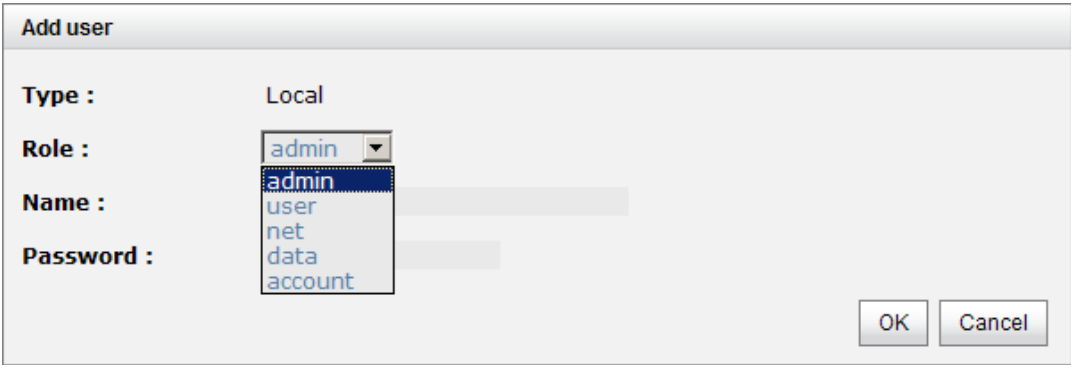
Create

**TIP:**

The username "admin" cannot be changed the role type and it cannot be deleted.

The options are available on this tab:

- Create:** Add a new account. When clicking **Create** button, it pop-up a dialog as the following. Choose a role, enter a name and password. And then click **OK**.



The 'Add user' dialog box contains the following fields and options:

- Type :** Local
- Role :** A dropdown menu with 'admin' selected.
- Name :** A text input field with 'admin' entered.
- Password :** A text input field with 'user' entered.

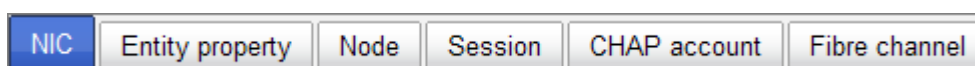
At the bottom right, there are 'OK' and 'Cancel' buttons.

- **OP. -> Change password:** Change the user's password.
- **OP. -> Change user role:** Change the user's role.
- **OP. -> Delete:** Delete the user.

Users can log on the storage system with the new accounts and operate the function which is according to the permission of the role.

Fibre Channel / Host Port / iSCSI Configuration





The **Fibre channel / Host port / iSCSI configuration** menu option is for accessing the **NIC, Entity property, Node, Session, CHAP account** and **Fibre channel** (This option is only visible when the controller has FC ports) option tabs.



Fibre Channel

The **Fibre channel** tab is used view the fibre channel informations, and change the link speed of FC. It displays the Port ID, Connection Mode, Data Rate, WWNN (World Wide Node Name), WWPN (World Wide Port Name) and the link status.

Show information for: **Controller 1**

	Name	Port ID	Connection Mode	Data Rate	WWNN/WWPN	Link
	Port 1	1	Arbitrated Loop	8 Gb/s	WWNN: 2000001378B92030 WWPN: 2100001378B92030	Up
	Port 2	2	Arbitrated Loop	8 Gb/s	WWNN: 2000001378B92030 WWPN: 2200001378B92030	Up
	Port 3	1	Arbitrated Loop	8 Gb/s	WWNN: 2000001378B92030 WWPN: 2300001378B92030	Up
	Port 4	2	Arbitrated Loop	8 Gb/s	WWNN: 2000001378B92030 WWPN: 2400001378B92030	Up

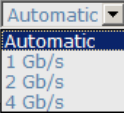
Change Link Speed
Change Connection Mode

The options are available on this tab:

- OP. -> Change Link Speed:** The options have **Automatic / 1 Gb/s / 2 Gb/s / 4 Gb/s** (for F300Q / F400Q), **Automatic / 2 Gb/s / 4 Gb/s / 8 Gb/s** (for Q500-F20 / Q500-F21 / F600Q), **Automatic / 4 Gb/s / 8 Gb/s / 16 Gb/s** (for Q500-F30). The default and recommended setting is to automatically detect the data rate.

Data Rate

Select the data rate for Port 2 on Controller 1 below. The default and recommended setting is for the array to automatically detect the data rate.

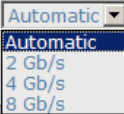
Data Rate: 

Automatic
1 Gb/s
2 Gb/s
4 Gb/s

OK Cancel

Data Rate

Select the data rate for Port 4 on Controller 1 below. The default and recommended setting is for the array to automatically detect the data rate.

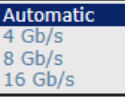
Data Rate: 

Automatic
2 Gb/s
4 Gb/s
8 Gb/s

OK Cancel

Data Rate

Select the data rate for Port 1 on Controller 1 below. The default and recommended setting is for the array to automatically detect the data rate.

Data Rate: 

Automatic
4 Gb/s
8 Gb/s
16 Gb/s

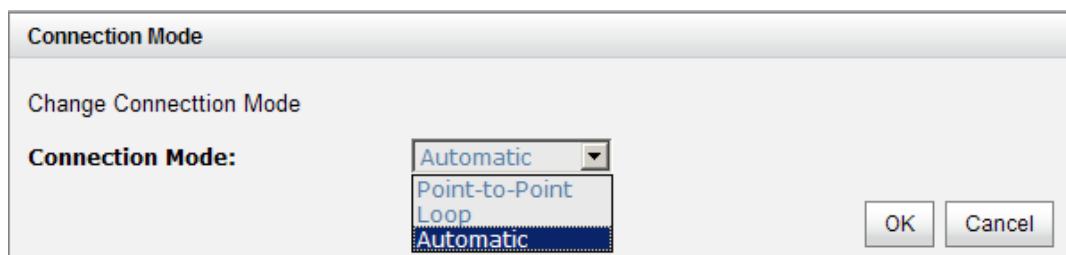
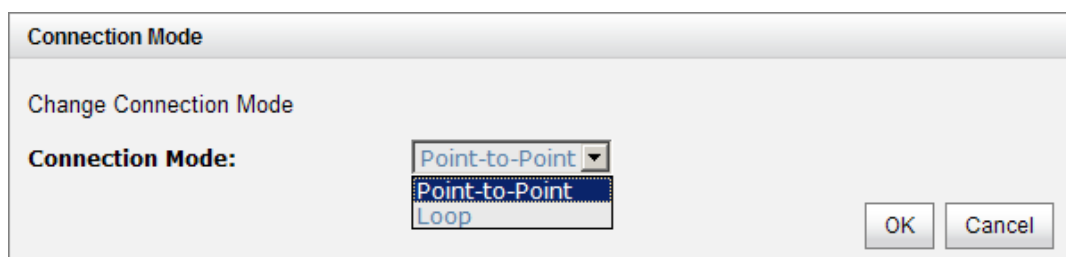
OK Cancel



TIP:

Please be aware that there is no "Automatic" in Q500-F20 model. Q500-F21 doesn't support automatic link speed negotiation.

- **OP. -> Change Connection Mode:** The options have **Automatic** (only for F300Q / F400Q) / **Loop** / **Point-to-Point**. The default and recommended setting in F300Q and F400Q is automatically to detect the connection mode. F600Q must select the connection mode by manual. For Q500-F30 model, 16Gb link speed only supports Point-to-Point mode.

NIC

The **NIC** tab is used to change IP addresses of iSCSI data ports. The various controllers have different iSCSI ports, list on the following:

AegisSAN Q500:

- **Q500-F20:** 2 x GbE iSCSI ports per controller.
- **Q500-F21:** 2 x GbE iSCSI ports per controller.
- **Q500-F30:** 2 x GbE iSCSI ports per controller.
- **Q500-P10:** 6 x GbE iSCSI ports per controller.
- **Q500-P20:** 2 x 10GbE iSCSI ports + 2 x GbE iSCSI ports per controller.

AegisSAN:

- **F400Q:** 1 x GbE iSCSI port per controller.
- **P300Q:** 4 x GbE iSCSI ports per controller.
- **P500Q:** 2 x 10GbE iSCSI ports per controller.

AegisSAN LX:

- **F600Q:** 2 x GbE iSCSI ports per controller.
- **P400Q:** 6 x GbE iSCSI ports per controller.

- **P600Q:** 2 x 10GbE iSCSI ports + 2 x GbE iSCSI port per controller.

Each port must be assigned its own IP address. They need to be configured in multi-homed mode, or a present link aggregation / trunking mode. When multiple iSCSI data ports are set up in link aggregation or trunking mode, all the data ports share a single IP address. The following example shows the P300Q series (4 x GbE iSCSI ports).

Show information for: **Controller 1**

	Name	LAG	LAG No	VLAN ID	DHCP	IP address	Netmask	Gateway	Jumbo frame	MAC address	Link
OP.	LAN1	No	N/A	N/A	No	192.168.1.1	255.255.255.0	192.168.1.254	Disabled	00:13:78:b7:01:b8	Down
OP.	LAN2	No	N/A	N/A	No	192.168.2.1	255.255.255.0	192.168.2.254	Disabled	00:13:78:b7:01:b9	Down
OP.	LAN3	No	N/A	N/A	No	192.168.3.1	255.255.255.0	192.168.3.254	Disabled	00:13:78:b7:01:ba	Down
OP.	LAN4	No	N/A	N/A	No	192.168.4.1	255.255.255.0	192.168.4.254	Disabled	00:13:78:b7:01:bb	Down

Link aggregation
 Set VLAN ID
 IP settings for iSCSI ports
 Become default gateway
 Enable jumbo frame
 Ping host
 Enable QReplia

This figure shows four iSCSI data ports on each controller. The four 1GbE data ports are set up with a static IP address. For the other controllers, that can be set up the same way.

The options are available on this tab:

- **OP. -> Link aggregation:** The default mode of each iSCSI data port is that it is individually connected without any link aggregation and trunking. Trunking and LACP (Link Aggregation Control Protocol) settings can be set or changed by selecting the **Link aggregation** option. Select **Aggregation** method and its options. At least two iSCSI NICs must be selected for iSCSI bonding to work.

Aggregation

Select NICs to have multiple cable/ports to be aggregated together to form a single pseudo cable/port.

Aggregation : ☒ Trunking ☐ LACP

Address : 192.168.1.1

Mask : 255.255.255.0

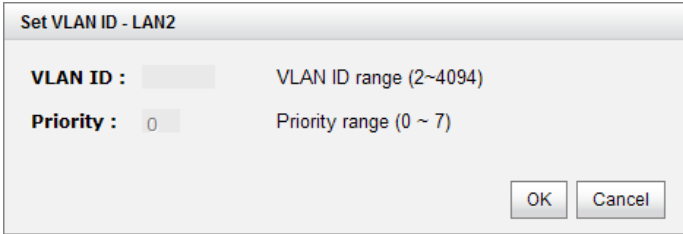
Gateway : 192.168.1.254

NIC : ☒ LAN1 ☒ LAN2 ☐ LAN3 ☐ LAN4

OK
Cancel

- **Trunking:** Configures multiple iSCSI data ports in parallel to increase the link speed beyond the limits of any single port.

- **LACP:** It is part of IEEE specification 802.3ad that allows several physical ports to be bundled together to form a single logical channel. This increases the bandwidth and provides automatically failover when link status fails on a port.
- **OP. -> Set VLAN ID:** VLAN is a logical grouping mechanism implemented on switch device. VLANs are collections of switching ports that comprise a single broadcast domain. It allows network traffic to flow more efficiently within these logical subgroups. Please consult your network switch user manual for VLAN setting instructions. Most of the work is done at the switch part. All you need to do is to make sure that your iSCSI port's VLAN ID matches that of switch port. If your network environment supports VLAN, you can click **Set VLAN ID** to change the configurations. Fill in VLAN ID and Priority settings to enable VLAN.




The dialog box titled "Set VLAN ID - LAN2" contains two input fields. The first is labeled "VLAN ID :" with a text box next to it, and to its right is the text "VLAN ID range (2~4094)". The second is labeled "Priority :" with a text box containing the value "0", and to its right is the text "Priority range (0 ~ 7)". At the bottom right of the dialog are two buttons: "OK" and "Cancel".

- **VLAN ID:** VLAN ID is a 12-bit number. Its range is from 2 to 4094, while 0, 1, and 4095 are reserved for special purposes.
- **Priority:** The PCP (Priority Code Point) is a 3-bit number and reserved for QoS. The definition complies with IEEE 802.1p protocol, ranging from 0 to 7, with 0 as the default value. In normal cases, you don't need to set this value. Using the default will do just fine.

**TIP:**

If iSCSI ports are assigned with VLAN ID before creating aggregation takes place, aggregation will remove VLAN ID. You need to repeat the steps to set VLAN ID for the aggregation group.

- **OP. -> IP settings for iSCSI ports:** To change an iSCSI IP address, click **IP settings for iSCSI ports**. There are two options: DHCP or Static. You can select DHCP to acquire and IP address automatically or Static to set the IP address manually.



iSCSI IP address

You can check 'DHCP' to acquire IP address from DHCP server, or check 'Static' to setup IP address.

☐ DHCP
☒ Static

Address : 192.168.1.1
Mask : 255.255.255.0
Gateway : 192.168.1.254

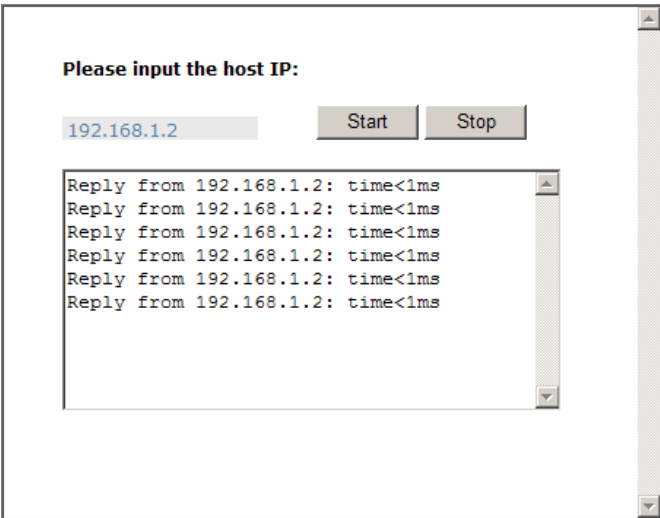
OK Cancel

- **OP. -> Become default gateway:** The default gateway can be changed by clicking **Become default gateway**. There can be only one default gateway. To remove the default gateway, click **OP.** of the LAN that is currently the gateway, and select **Remove default gateway**.
- **OP. -> Enable jumbo frame:** The MTU (Maximum Transmission Unit) size can be enabled by checking **Enable jumbo frame**. Maximum jumbo frame size is **9000** bytes. To disable jumbo frame, click **OP.** of the LAN that uses jumbo frame, and select **Disable jumbo frame**.

**CAUTION:**

VLAN ID, jumbo frames for both the switching hub and HBA on host must be enabled. Otherwise, the LAN connection cannot work properly.

- **OP. -> Ping host:** To verify that the port connection from a target to the corresponding host data port is good, click **Ping host**. Enter the IP address and click **Start** button. The system sends out six pings. Or click **Stop** button to stop the test.



Please input the host IP:

192.168.1.2 Start Stop

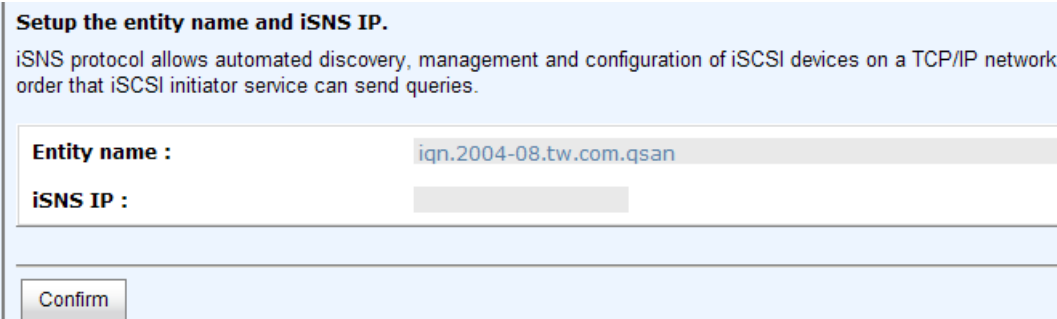
```

Reply from 192.168.1.2: time<1ms
Reply from 192.168.1.2: time<1ms
Reply from 192.168.1.2: time<1ms
Reply from 192.168.1.2: time<1ms
Reply from 192.168.1.2: time<1ms
Reply from 192.168.1.2: time<1ms
  
```

- **OP. -> Enable QReplica (visible at the last iSCSI port):** Click it to use the iSCSI port to enable the QReplica function. The replication data is transferred on this port. Click **Disable QReplica** to change the port back to the normal iSCSI port.

Entity Property

The **Entity property** tab is used to view the entity name of the system, and setup iSNS IP for the iSNS (Internet Storage Name Service) protocol. It allows automated discovery, management and configuration of iSCSI devices on a TCP/IP network. To use iSNS, an iSNS server needs to be added to the SAN. When this is done, the iSNS server IP address must be added to the storage system for iSCSI initiator service to send queries to it.



To make changes, enter the **Entity name** and the **iSNS IP** address, and then click **Confirm**.

Node

The **Node** tab is used to view the target name for iSCSI initiator. The various controllers support different number of multiple nodes, list on the following:

AegisSAN Q500:

- **Q500-F20:** Up to 32 multiple nodes per controller.
- **Q500-F21:** Up to 32 multiple nodes per controller.
- **Q500-F30:** Up to 32 multiple nodes per controller.
- **Q500-P10:** Up to 64 multiple nodes per controller.
- **Q500-P20:** Up to 64 multiple nodes per controller.

AegisSAN:

- **F400Q:** Up to 16 multiple nodes per controller.
- **P300Q:** Up to 32 multiple nodes per controller.
- **P500Q:** Up to 32 multiple nodes per controller.













AegisSAN LX:

- **F600Q:** Up to 32 multiple nodes per controller.
- **P400Q:** Up to 128 multiple nodes per controller.
- **P600Q:** Up to 128 multiple nodes per controller.

The following example shows the P300Q series (up to 32 multiple nodes).

Show information for: **Controller 1**

<< first < prev 1 2 3 next > last >>

	ID	Auth	Name	Portal	Alias
	0	None	iqn.2004-08.tw.com.qsan:dev0.ctr1	192.168.1.1:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260	
	1	None	iqn.2004-08.tw.com.qsan:dev1.ctr1	192.168.1.1:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260	
	2	None	iqn.2004-08.tw.com.qsan:dev2.ctr1	192.168.1.1:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260	
	3	None	iqn.2004-08.tw.com.qsan:dev3.ctr1	192.168.1.1:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260	
	4	None	iqn.2004-08.tw.com.qsan:dev4.ctr1	192.168.1.1:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260	
	5	None	iqn.2004-08.tw.com.qsan:dev5.ctr1	192.168.1.1:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260	
	6	None	iqn.2004-08.tw.com.qsan:dev6.ctr1	192.168.1.1:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260	
	7	None	iqn.2004-08.tw.com.qsan:dev7.ctr1	192.168.1.1:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260	
	8	None	iqn.2004-08.tw.com.qsan:dev8.ctr1	192.168.1.1:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260	
	9	None	iqn.2004-08.tw.com.qsan:dev9.ctr1	192.168.1.1:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260	
	10	None	iqn.2004-08.tw.com.qsan:dev10.ctr1	192.168.1.1:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260	
	11	None	iqn.2004-08.tw.com.qsan:dev11.ctr1	192.168.1.1:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260	

<< first < prev 1 2 3 next > last >>

The options are available on this tab:

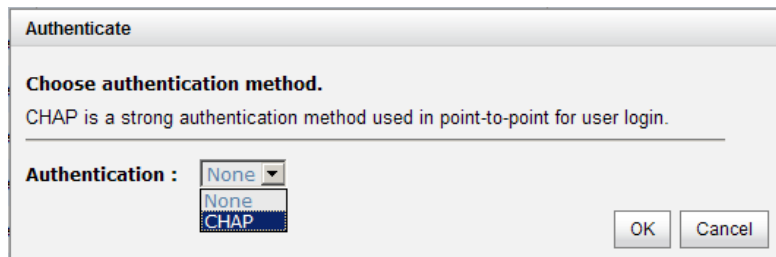
- **OP. -> Authenticate:** CHAP (Challenge Handshake Authentication Protocol) is a strong authentication method used in point-to-point for user login. It's a type of authentication in which the authentication server sends the client a key to be used for encrypting the username and password. CHAP enables the username and password to transmit in an encrypted form for protection.

**TIP:**

A CHAP account must be added before you can use this authentication method. Please refer to CHAP Account session to create an account if none exists.

To use CHAP authentication, please follow the procedures.

- Select one of nodes from one controller.
- Click **OP. -> Authenticate**.
- Select **CHAP** from the drop-down list..



Authenticate

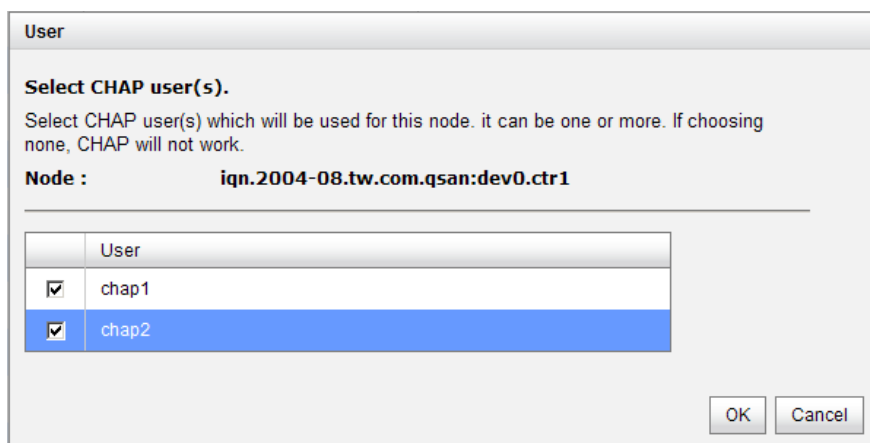
Choose authentication method.
CHAP is a strong authentication method used in point-to-point for user login.

Authentication : None
None
CHAP

- Click **OK** button.

	ID	Auth	Name	Portal	Alias
<input type="button" value="OP."/>	0	CHAP	iqn.2004-08.tw.com.qsan:dev0.ctr1	192.168.1.1:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260	
<input type="button" value="OP."/>	1	CHAP	iqn.2004-08.tw.com.qsan:dev1.ctr1	192.168.1.1:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260	
<input type="button" value="OP."/>	2	None	iqn.2004-08.tw.com.qsan:dev2.ctr1	192.168.1.1:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260	
<input type="button" value="OP."/>	3	None	iqn.2004-08.tw.com.qsan:dev3.ctr1	192.168.1.1:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.4.1:3260	

- Click **OP.** -> **User**.
- Select CHAP user(s) which will be used. It can be more than one, but it must be at least one for CHAP to work.



User

Select CHAP user(s).
Select CHAP user(s) which will be used for this node. It can be one or more. If choosing none, CHAP will not work.

Node : **iqn.2004-08.tw.com.qsan:dev0.ctr1**

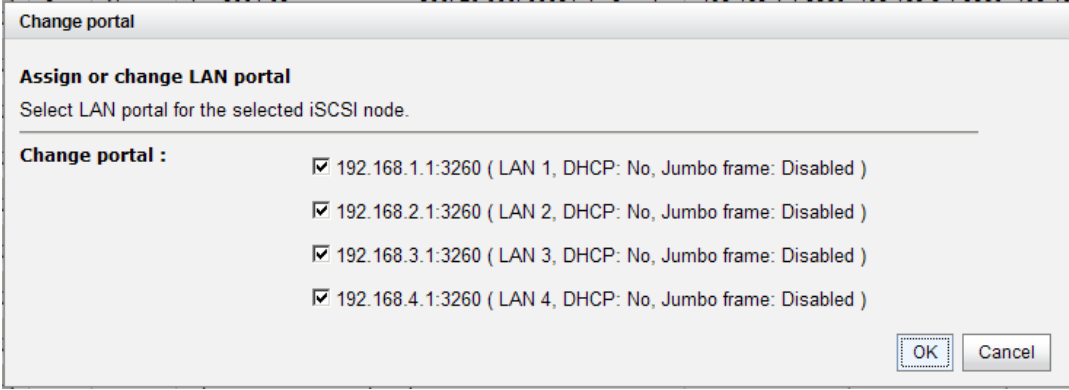
	User
<input checked="" type="checkbox"/>	chap1
<input checked="" type="checkbox"/>	chap2

- Click **OK** button.

To disable CHAP authentication, please follow the procedures.

- Select the node which wants to disable CHAP.
- Click **OP.** -> **Authenticate**.
- Change it to **None** from the drop-down list.
- Click **"OK"**.
- OP. -> Change portal:** Use this iSCSI node option to change the network ports available.
 - Select one of nodes from one controller.
 - Click **OP.** -> **Change portal**.

- Check the portals which you want for the controllers.



Change portal

Assign or change LAN portal

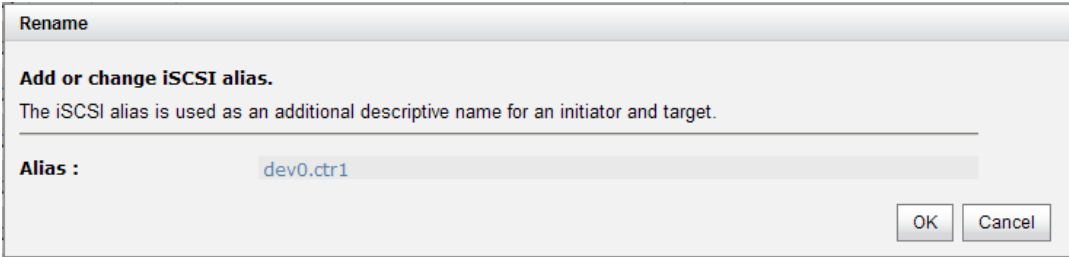
Select LAN portal for the selected iSCSI node.

Change portal :

- ☒ 192.168.1.1:3260 (LAN 1, DHCP: No, Jumbo frame: Disabled)
- ☒ 192.168.2.1:3260 (LAN 2, DHCP: No, Jumbo frame: Disabled)
- ☒ 192.168.3.1:3260 (LAN 3, DHCP: No, Jumbo frame: Disabled)
- ☒ 192.168.4.1:3260 (LAN 4, DHCP: No, Jumbo frame: Disabled)

OK Cancel

- Click **OK** button.
- **OP. -> Rename alias:** Use this option to create an alias to one device node.
 - Select one of nodes from one controller.
 - Click **OP. -> Rename.**
 - Enter the Alias name.
 - Click **OK** button.



Rename

Add or change iSCSI alias.

The iSCSI alias is used as an additional descriptive name for an initiator and target.

Alias :

OK Cancel

After creating an alias, it is displayed at the end of the portal information.

	ID	Auth	Name	Portal	Alias
OP.	0	CHAP	iqn.2004-08.tw.com.qsan:dev0.ctr1	192.168.1.1:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.10.125:3260	dev0.ctr1
OP.	1	CHAP	iqn.2004-08.tw.com.qsan:dev1.ctr1	192.168.1.1:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.10.125:3260	
OP.	2	None	iqn.2004-08.tw.com.qsan:dev2.ctr1	192.168.1.1:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.10.125:3260	
OP.	3	None	iqn.2004-08.tw.com.qsan:dev3.ctr1	192.168.1.1:3260, 192.168.2.1:3260, 192.168.3.1:3260, 192.168.10.125:3260	



TIP:

After setting CHAP, the host initiator should be set with the same CHAP account. Otherwise, the host cannot connect to the volume.

Session

The **Session** tab is used to display all currently active iSCSI sessions and their connection information. The various controllers support different number of sessions, list on the following:

AegisSAN Q500:

- **Q500-F20:** Up to 32 sessions per controller.
- **Q500-F21:** Up to 32 sessions per controller.
- **Q500-F30:** Up to 32 sessions per controller.
- **Q500-P10:** Up to 64 sessions per controller.
- **Q500-P20:** Up to 64 sessions per controller.

AegisSAN:

- **F400Q:** Up to 32 sessions per controller.
- **P300Q:** Up to 128 sessions per controller.
- **P500Q:** Up to 128 sessions per controller.

AegisSAN LX:

- **F600Q:** Up to 128 sessions per controller.
- **P400Q:** Up to 1024 sessions per controller.
- **P600Q:** Up to 1024 sessions per controller.

Display iSCSI session and connection information, including other items.

Show information for: **Controller 1**

	No.	TSIH	Initiator name	Target name	InitialR2T	Immed. data	MaxOutR2T	MaxDataBurstLen	DataSeqInOrder	DataPDUIInOrder
OP	0	0x0001	iqn.1991-05.com.microsoft.qsan	iqn.2004-08.tw.com.qsan.dev0.ctr1	Yes	Yes	1	262144	Yes	Yes

List connection
Delete

This table shows the column descriptions. Most of the options are standard parameters used in the negotiation between the initiator and target when a iSCSI connection is created.

Column Name	Description
TSIH	TSIH (Target Session Identifying Handle) is used for this active session.
Initiator Name	It displays the host computer name.
Target Name	It displays the controller name.
InitialR2T	InitialR2T (Initial Ready to Transfer) is used to turn off either the use of a unidirectional R2T command or the output part of a bidirectional command. The default value is Yes.
Immed. data	Immed. data (Immediate Data) sets the support for immediate data between the initiator and the target. Both must be set to the same setting. The default value is Yes.
MaxDataOutR2T	MaxDataOutR2T (Maximum Data Outstanding Ready to Transfer) determines the maximum number of outstanding ready to transfer per task. The default value is 1.

MaxDataBurstLen	MaxDataBurstLen (Maximum Data Burst Length) determines the maximum SCSI data payload. The default value is 256kb.
DataSeginOrder	DataSeginOrder (Data Sequence in Order) determines if the PDU (Protocol Data Units) are transferred in continuously non-decreasing sequence offsets. The default value is Yes.
DataPDU InOrder	DataPDU InOrder (Data PDU in Order) determines if the data PDUs within sequences are to be in order and overlays forbidden. The default value is Yes.

The options are available on this tab:

- **OP. -> List connection:** It can list all connection(s) of the session.

Connection					
No.	Initiator IP	Initiator name	MaxRecvDataSegLen	MaxTransDataSegLen	Authentication
1	192.168.10.121	iqn.1991-05.com.microsoft:qsan	16384	65536	No

OK

- **OP. -> Delete:** Click it to disconnect the session, click **OK** button to confirm.

CHAP Account

The **CHAP account** tab is used to manage the CHAP accounts on the system.

The options are available on this tab:

- **Create:** Click the **Create** button to create a user.

Create

Create a CHAP user

To create a CHAP user account, enter 'User', 'Secret', and 'Confirm' secret. One or multiple nodes can be selected here or later. If selecting none, it can be enabled in 'iSCSI configuration / Node / User'.

User :

chap1

(max: 223)

Secret :

.....

(min: 12, max: 16)

Confirm :

.....

(min: 12, max: 16)

Node :

0

1

2

3

4

5

6

7

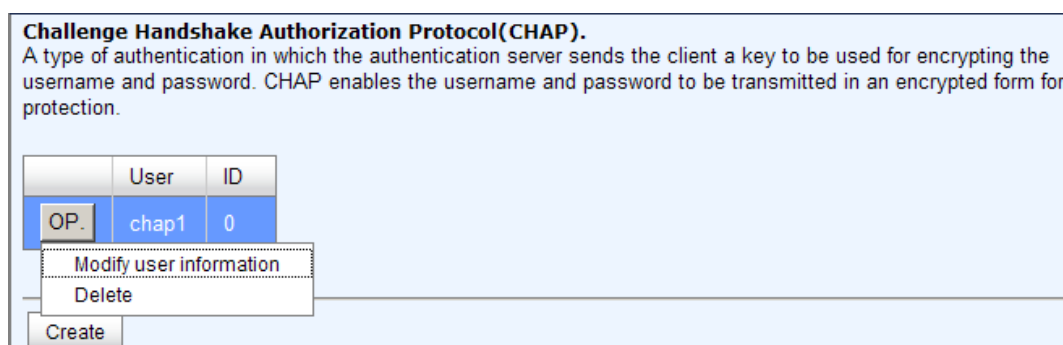
8

9

OK

Cancel

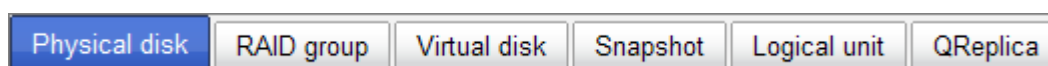
- Enter data for User, Secret, and Confirm secret.
- If necessary, select one or multiple nodes. If selecting none, they can be added later by going to iSCSI configuration -> Node -> User.
- Click OK button.



- **OP. -> Modify user information:** Click it to modify the **Secret**, **Confirm** secret and **nodes** informations.
- **OP. -> Delete:** Click it to delete the user.

Volume Configuration





The **Volume configuration** menu option is for accessing the **Physical disk**, **RAID group**, **Virtual disk**, **Snapshot**, **Logical unit**, and **QReplica** (This option is only visible when QReplica license is enabled.) option tabs.



Physical Disk

The **Physical disk** tab provides the status of the hard drives in the system. The two drop-down lists at the top enable you to switch between the local system and any expansion JBOD systems attached. The other is to change the drive size units (MB or GB).

Show PD for: Local Show size unit as: (GB)

	Slot	Size(GB)	RG	RAID Set	Status	Health	Usage	Vendor	Serial	Rate	Write cache	Standby	Readahead	Command queuing
	1	1862	RG-R5	1	Online	Good	RAID disk	WDC	WD-WCAVY4138645	SATA 3.0Gb/s	Disabled	Disabled	Enabled	Enabled
	2	1862	RG-R5	1	Online	Good	RAID disk	WDC	WD-WCAVY4066482	SATA 3.0Gb/s	Disabled	Disabled	Enabled	Enabled
	3	1862	RG-R5	1	Online	Good	RAID disk	WDC	WD-WCAVY4158095	SATA 3.0Gb/s	Disabled	Disabled	Enabled	Enabled
	4	1862		N/A	Online	Good	Free disk	WDC	WD-WCAVY3924333	SATA 3.0Gb/s	Disabled	Disabled	Enabled	Enabled

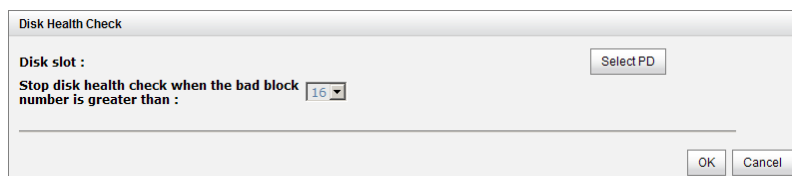
This table shows the column descriptions.

Column Name	Description
Slot	The position of a hard drive. The button next to the number of slot shows the functions which can be executed.
Size (GB) or (MB)	Capacity of hard drive. The unit can be displayed in GB or MB.
RG Name	RAID group name.
RAID Set (This option is only visible when QThin is enabled.)	The number of RAID Set: <ul style="list-style-type: none"> N/A: The RAID group is traditional provisioning. Number: The RAID group is the number of RAID set of thin provisioning.
Status	The status of the hard drive: <ul style="list-style-type: none"> Online: the hard drive is online. Rebuilding: the hard drive is being rebuilt. Transition: the hard drive is being migrated or is replaced by another disk when rebuilding occurs. Scrubbing: the hard drive is being scrubbed.
Health	The health of the hard drive: <ul style="list-style-type: none"> Good: the hard drive is good. Failed: the hard drive is failed. Error Alert: S.M.A.R.T. error alert. Read Errors: the hard drive has unrecoverable read errors.
Usage	The usage of the hard drive: <ul style="list-style-type: none"> RAID disk: This hard drive has been set to a RAID group. Free disk: This hard drive is free for use. Dedicated spare: This hard drive has been set as dedicated spare of a RG. Global spare: This hard drive has been set as global spare of all RGs.
Vendor	Hard drive vendor.
Serial	Hard drive serial number.
Rate	Hard drive rate: <ul style="list-style-type: none"> SAS 6Gb/s. SAS 3Gb/s. SATA 6Gb/s. SATA 3Gb/s. SATA 1.5Gb/s. (MSD platform does not support SATA 1.5Gb/s HDD after LSI Expander upgrade to FW 2.1.0.)
Write cache	Hard drive write cache is enabled or disabled. The default value is Enabled.
Standby	HDD auto spindown to save power. The default value is Disabled.
Readahead	This feature makes data be loaded to disk's buffer in advance for further use. The default value is Enabled.

Command queuing	Newer SATA and most SCSI disks can queue multiple commands and handle one by one. The default value is Enabled.
-----------------	---

The options are available on this tab:

- **Disk Health Check:** Click the **Disk Health Check** button to check free disks. It can not check the disks which are in used.



Disk Health Check

Disk slot : Select PD

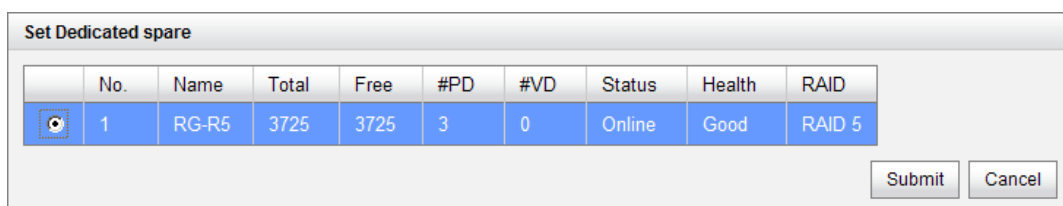
Stop disk health check when the bad block number is greater than : 16

OK Cancel


- **Disk Check Report:** Click the **Disk Check Report** button to download disk check report.
- **OP. -> Set Free disk:** Make the selected hard drive be free for use.
- **OP. -> Set Global spare:** Set the selected hard drive to global spare of all RGs.
- **OP. -> Set Dedicated spare:** Set a hard drive to dedicated spare of the selected RG.
- **OP. -> Upgrade:** Upgrade hard drive firmware.
- **OP. -> Disk Scrub:** Scrub the hard drive.
- **OP. -> Turn on/off the indication LED:** Turn on the indication LED of the hard drive. Click again to turn off.
- **OP. -> More information:** Show hard drive detail information.

Take an example to set the fourth PD to dedicated spare disk.

1. Check **OP. -> Set Dedicated spare** at the fourth PD.



Set Dedicated spare

	No.	Name	Total	Free	#PD	#VD	Status	Health	RAID
	1	RG-R5	3725	3725	3	0	Online	Good	RAID 5

Submit Cancel

2. If there is any RG which is in protected RAID level and can be set with dedicate spare disk, select one RG, and then click **Submit** button.



TIP:

- In AegisSAN Q500, the maximum number of physical drives in a system is 192.
- In AegisSAN F300Q / F400Q / P300Q / P500Q / S300Q, the maximum number of physical drives in a system is 72.
- In AegisSAN LX F600Q / P400Q / P600Q, the maximum number of physical

drives in a systme is 192.

RAID Group

The **RAID group** tab provides to create, modify, delete, or view the status of the RAID groups. Use the drop-down list at the top to change the drive size units (MB or GB).

Select the traditional RAID group, it displays on the following.

Show size unit as: (GB) ▼

	Name	Total(GB)	Free(GB)	Avail(GB)	Thin	#PD	#VD	Status	Health	RAID	Current owner	Preferred owner
<input type="radio"/>	RG-R0	1862	1862	1862	Disabled	1	0	Online	Good	RAID 0	Controller 1	Controller 1
<input checked="" type="radio"/>	RG-R5	3725	3725	3725	Enabled	3	0	Online	Good	RAID 5	Controller 1	Controller 1

Create

Select the thin provisioning RAID group, it displays on the following. There are two more tables to describe the properties of thin provisioning RAID group, RAID Set and RAID Group Policy.

Show size unit as: (GB) ▼

	Name	Total(GB)	Free(GB)	Avail(GB)	Thin	#PD	#VD	Status	Health	RAID	Current owner	Preferred owner
<input type="radio"/>	RG-R0	1862	1862	1862	Disabled	1	0	Online	Good	RAID 0	Controller 1	Controller 1
<input checked="" type="radio"/>	RG-R5	3725	3725	3725	Enabled	3	0	Online	Good	RAID 5	Controller 1	Controller 1

RAID Set :

	No	Total size(GB)	Free size(GB)	#PD	RAID Cell	Status	Health
<input checked="" type="radio"/>	1	3725	3725	3	1	Online	Good

RAID Group Policy :

<< first < prev 1 next > last >>

	No	Threshold	Level	Action
<input type="radio"/>	1	60%	INFO	Take no action
<input type="radio"/>	2	70%	INFO	Take no action
<input type="radio"/>	3	80%	INFO	Take no action
<input type="radio"/>	4	85%	WARNING	Reclaim space
<input type="radio"/>	5	90%	WARNING	Delete snapshots
<input type="radio"/>	6	95%	WARNING	De-activate RG

<< first < prev 1 next > last >>

Create

This table shows the column descriptions.

Column Name	Description
Name	RAID group name.
Total (GB) or (MB)	Total capacity of this RAID group. The unit can be displayed in GB or MB.
Free (GB) or (MB)	Free capacity of this RAID group. The unit can be displayed in GB or MB.
Avail (GB) or (MB) (<i>This option is only visible when QThin is enabled.</i>)	Available capacity of this RAID group. The unit can be displayed in GB or MB.
Thin (<i>This option is only visible when QThin is enabled.</i>)	The status of QThin: <ul style="list-style-type: none"> • Disabled. • Enabled.
#PD	The number of physical disks in a RAID group.
#VD	The number of virtual disks in a RAID group.
Status	The status of the RAID group: <ul style="list-style-type: none"> • Online: the RAID group is online. • Offline: the RAID group is offline. • Rebuild: the RAID group is being rebuilt. • Migrate: the RAID group is being migrated. • Scrubbing: the RAID group is being scrubbed.
Health	The health of the RAID group: <ul style="list-style-type: none"> • Good: the RAID group is good. • Failed: the RAID group fails. • Degraded: the RAID group is not healthy and not completed. The reason could be lack of disk(s) or have failed disk
RAID	The RAID level of the RAID group.
Current owner (<i>This option is only visible when dual controllers are installed.</i>)	The owner of the RAID group. The default owner is controller 1.
Preferred owner (<i>This option is only visible when dual controllers are installed.</i>)	The preferred owner of the RAID group. The default owner is controller 1.

The options are available on this tab:

- **Create:** Click the **Create** button to create a RAID group.

The options are available after creating a RAID group:

- **OP. -> Migrate:** Change the RAID level of a RAID group. Please refer to next chapter for details.
- **OP. -> Move:** Move the member disks of RAID group to totally different physical disks.
- **OP. -> Activate:** Activate the RAID group after disk roaming; it can be executed when RG status is offline. This is for online disk roaming purpose.

- **OP. -> Deactivate:** Deactivate the RAID group before disk roaming; it can be executed when RG status is online. This is for online disk roaming purpose.
- **OP. -> Parity check:** Regenerate parity for the RAID group. It supports RAID 3 / 5 / 6 / 30 / 50 / 60.
- **OP. -> Delete:** Delete the RAID group.
- **OP. -> Set preferred owner:** Set the RG ownership to the other controller.
- **OP. -> Set disk property:** Change the disk property of write cache and standby options.
 - Write cache:
 - ✓ Enabled: Enable disk write cache. (Default)
 - ✓ Disabled: Disable disk write cache.
 - Standby:
 - ✓ Disabled: Disable auto spindown. (Default)
 - ✓ 30 sec / 1 min / 5 min / 30 min: Enable hard drive auto spindown to save power when no access after certain period of time.
 - Read ahead:
 - ✓ Enabled: Enable disk read ahead. (Default)
 - ✓ Disabled: Disable disk read ahead.
 - Command queuing:
 - ✓ Enabled: Enable disk command queue. (Default)
 - ✓ Disabled: Disable disk command queue.
- **OP. -> Add RAID set:** Add RAID set for thin provisioning RAID group.
- **OP. -> Add policy:** Add policy for thin provisioning RAID group..
- **OP. -> More information:** Show RAID group detail information.

RAID Set table shows the column descriptions.

Column Name	Description
No	Number of RAID set.
Total size (GB)	Total capacity of this RAID set.
Free size (GB)	Free capacity of this RAID set.
#PD	The number of physical disks in a RAID set.
RAID Cell	The number of RAID cell.
Status	The status of RAID set: <ul style="list-style-type: none"> • Online: the RAID group is online. • Offline: the RAID group is offline. • Rebuild: the RAID group is being rebuilt. • Migrate: the RAID group is being migrated. • Scrubbing: the RAID group is being scrubbed.
Health	The health of RAID set: <ul style="list-style-type: none"> • Good: the RAID group is good. • Failed: the RAID group fails. • Degraded: the RAID group is not healthy and not completed. The

reason could be lack of disk(s) or have failed disk

The options are available on this tab:

- **OP. -> Remove:** Remove the RAID set.
- **OP. -> Move:** Move the member disks of RAID set to totally different physical disks.
- **OP. -> List PD:** List the member of physical disks.

RAID Group Policy table shows the column descriptions.

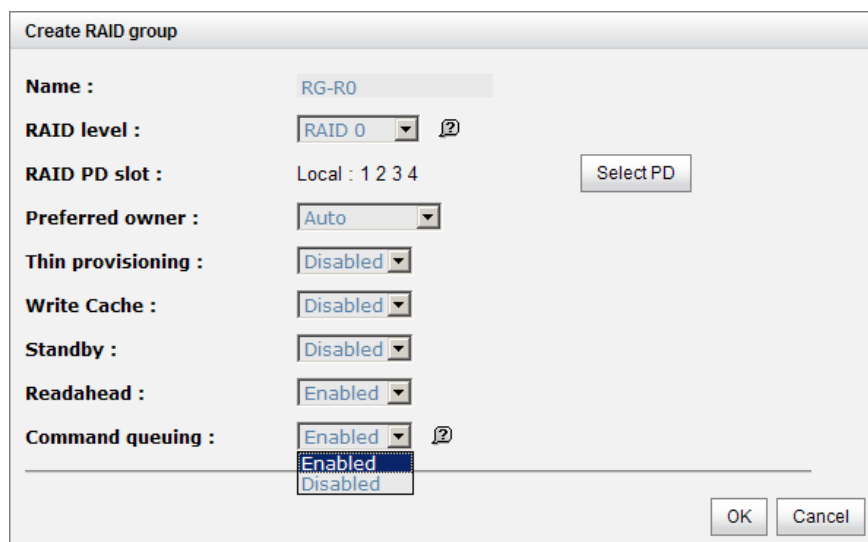
Column Name	Description
No	Number of RAID group policy.
Threshold	The threshold of the policy.
Level	The event level of the policy. It can be defined by yourself. <ul style="list-style-type: none"> • INFO • WARNING • ERROR
Action	The status of RAID set: <ul style="list-style-type: none"> • Take no action. • Reclaim space. • Delete snapshot. • De-active RG.

The options are available on this tab:

- **OP. -> Delete:** Delete the policy.
- **OP. -> Modify:** Modify the level and the action of the policy.

Take an example of creating a RAID group.

1. Click the **Create** button.



2. Enter a **Name** for the RAID group.
3. Use the drop-down list to select a **RAID level**.
4. Click the **Select PD** button to select disks from either local or expansion JBOD systems, and click **OK** to complete the selection. The selected disks are displayed at **RAID PD slot**.
5. Optionally, configure the following:
 - **Preferred owner:** This option is only visible when dual controllers are installed. The default value is Auto.
 - **Thin provisioning:** This option is only visible when thin provisioning feature is enabled. The default value is Disabled.
 - **Write Cache:** It's to enable or disable the write cache option of hard drives. The default value is Disabled.
 - **Standby:** It's to enable or disable the auto spindown function of hard drives, when this option is enabled and hard drives have no I/O access after certain period of time, they will spin down automatically. The default value is Disabled.
 - **Readahead:** It's to enable or disable the read ahead function. The default value is Enabled.
 - **Command queuing:** It's to enable or disable the hard drives' command queue function. The default value is Enabled.
6. Click **OK** button to create the RAID group.
7. At the confirmation message, click **OK** button.

**TIP:**

- In AegisSAN Q500, the maximum number of physical drives in a RAID group is 64.
- In AegisSAN F300Q / F400Q / P300Q / P500Q / S300Q, the maximum number of physical drives in a RAID group is 32.
- In AegisSAN LX F600Q / P400Q / P600Q, the maximum number of physical drives in a RAID group is 64.

Virtual Disk

The **Virtual disk** tab provides to create, modify, delete, or view the status of the virtual disk. Use the drop-down list at the top to change the drive size units (MB or GB).

Show size unit as: GB

<< first < prev 1 next > last >>

	Name	Size(GB)	Write	Priority	Bg rate	Type	Clone	Schedule	Status	Health	R %	RAID	#LUN	Snapshot space(GB)	#Snapshot	RG
OP	VD-01	30	WB	HI	4	RAID	N/A	N/A	Online	Optimal		RAID 0	0	0/0	0	RG-R0
OP	VD-02	20	WB	HI	4	RAID	N/A	N/A	Online	Optimal		RAID 5	0	0/0	0	RG-R5

<< first < prev 1 next > last >>

Create Configuration

This table shows the column descriptions.

Column Name	Description
Name	Virtual disk name.
Size (GB) or (MB)	Total capacity of the virtual disk. The unit can be displayed in GB or MB.
Write	The right of virtual disk: <ul style="list-style-type: none"> • WT: Write Through. • WB: Write Back. • RO: Read Only.
Priority	The priority of virtual disk: <ul style="list-style-type: none"> • HI: High priority. • MD: Middle priority. • LO: Low priority.
Bg rate	Background task priority: <ul style="list-style-type: none"> • 4 / 3 / 2 / 1 / 0: Default value is 4. The higher number the background priority of a VD is, the more background I/O will be scheduled to execute.
Type	The type of virtual disk: <ul style="list-style-type: none"> • RAID: the virtual disk is normal. • BACKUP: the virtual disk is for clone usage.
Clone	The target name of virtual disk.
Schedule	The clone schedule of virtual disk:
Status	The status of virtual disk: <ul style="list-style-type: none"> • Online: The virtual disk is online. • Offline: The virtual disk is offline. • Initiating: The virtual disk is being initialized. • Rebuild: The virtual disk is being rebuilt. • Migrate: The virtual disk is being migrated. • Rollback: The virtual disk is being rolled back. • Parity checking: The virtual disk is being parity check.
Health	The health of virtual disk: <ul style="list-style-type: none"> • Optimal: the virtual disk is working well and there is no failed disk in the RG. • Degraded: At least one disk from the RG of the Virtual disk is failed or plugged out. • Failed: the RAID group disk of the VD has single or multiple failed disks than its RAID level can recover from data loss. • Partially optimal: the virtual disk has experienced recoverable read errors. After passing parity check, the health will become Optimal.
R %	Ratio (%) of initializing or rebuilding.
RAID	RAID level.
#LUN	Number of LUN(s) that virtual disk is attached to.
Snapshot space (GB) (MB)	The virtual disk size that is used for snapshot. The number means Used snapshot space / Total snapshot space. The unit can be displayed in GB or MB.
#Snapshot	Number of snapshot(s) that have been taken.
RG	The RG name of the virtual disk

The options are available on this tab:

- **Create:** Click the **Create** button to create a virtual disk.

- **Configuration:** Click the **Configuration** button to setup the clone configurations.

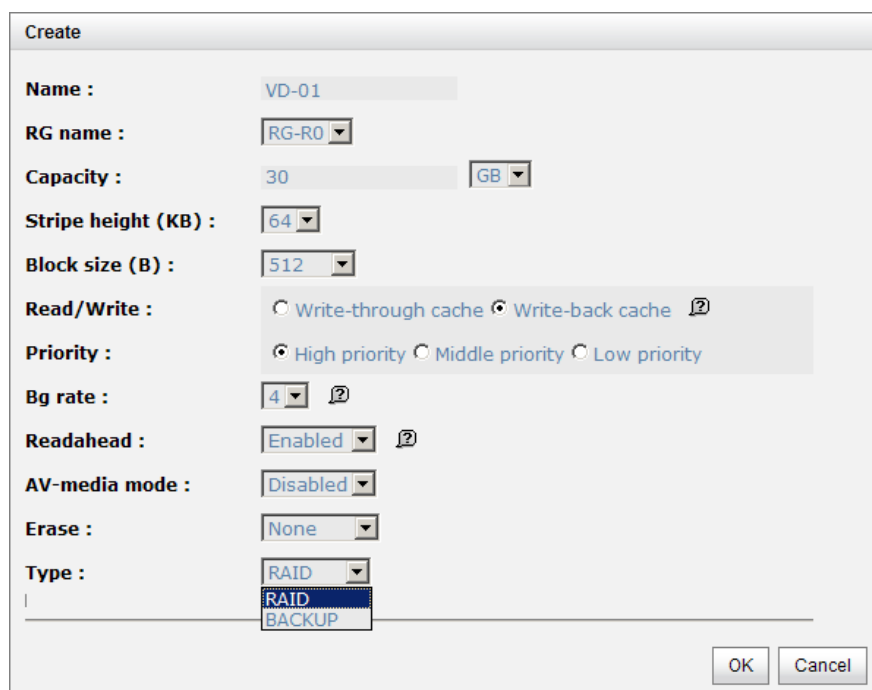
The options are available after creating a virtual disk:

- **OP. -> Extend:** Extend the virtual disk capacity.
- **OP. -> Parity check:** Execute parity check for the virtual disk. It supports RAID 3 / 5 / 6 / 30 / 50 / 60. The options are:
 - Regenerate parity when parity/data inconsistency is found.
 - Check parity/data consistency only. Stop checking when 1 / 10 / 20 / ... / 100 inconsistency is found.
- **OP. -> Delete:** Delete the virtual disk.
- **OP. -> Set property:** Change the VD name, right, priority, bg rate and read ahead.
 - Right:
 - ✓ WT: Write Through.
 - ✓ WB: Write Back. (Default)
 - ✓ RO: Read Only.
 - Priority:
 - ✓ HI: High priority. (Default)
 - ✓ MD: Middle priority.
 - ✓ LO: Low priority.
 - Bg rate:
 - ✓ 4 / 3 / 2 / 1 / 0: Default value is 4. The higher number the background priority of a VD is, the more background I/O will be scheduled to execute.
 - Read ahead:
 - ✓ Enabled: Enable disk read ahead. (Default)
 - ✓ Disabled: Disable disk read ahead.
 - AV-media mode:
 - ✓ Enabled: Enable AV-media mode for optimizing video editing.
 - ✓ Disabled: Disable AV-media mode. (Default)
 - Type:
 - ✓ RAID: the virtual disk is normal. (Default)
 - ✓ Backup: the virtual disk is for clone or QReplica usage.
- **OP. -> Space Reclamation:** Reclaim space for the virtual disk.
- **OP. -> Attach LUN:** Attach a LUN.
- **OP. -> Detach LUN:** Detach the LUN.
- **OP. -> List LUN:** List attached LUN(s).
- **OP. -> Set clone:** Set the target virtual disk for clone.
- **OP. -> Clear clone:** Clear clone function.
- **OP. -> Start clone:** Start clone function.

- **OP. -> Stop clone:** Stop clone function.
- **OP. -> Schedule clone:** Set clone function by schedule.
- **OP. -> Set snapshot space:** Set snapshot space for preparing to take snapshots.
- **OP. -> Cleanup snapshot:** Clean all snapshots of a VD and release the snapshot space.
- **OP. -> Take snapshot:** Take a snapshot on the virtual disk.
- **OP. -> Auto snapshot:** Set auto snapshot on the virtual disk.
- **OP. -> List snapshot:** List all snapshots of the virtual disk.
- **OP. -> More information:** Show virtual disk detail information.

Take an example of creating a virtual disk.

1. Click the **Create** button.



Create

Name : VD-01

RG name : RG-R0

Capacity : 30 GB

Stripe height (KB) : 64

Block size (B) : 512

Read/Write : ☐ Write-through cache ☒ Write-back cache

Priority : ☒ High priority ☐ Middle priority ☐ Low priority

Bg rate : 4

Readahead : Enabled

AV-media mode : Disabled

Erase : None

Type : RAID
RAID
BACKUP

OK Cancel

2. Enter a **Name** for the virtual disk.
3. Select RAID group from **RG name**.
4. Enter required **Capacity**.
5. Optionally, configure the following:
 - **Stripe height (KB):** The options are 4KB, 8KB, 16KB, 32KB, 64KB. The default value is 64KB.
 - **Block size (B):** The options are 512 to 65536. The default value is 512.
 - **Read/Write:** The options are Write-through cache and Write-back cache. The default value is Write-back cache.
 - **Priority:** The options are High, Middle and Low. The default value is High priority.

- **Bg rate:** Background task priority. The higher number the background priority of a VD has, the more background I/O will be scheduled to execute. The options are 0 to 4. The default value is 4.
 - **Readahead:** It is based on the notion that data is accessed sequentially, system will guess that will be needed next from that was just retrieved from disk, and load them into disk buffer for future use. The default value is Enabled.
 - **AV-media mode:** Optimize for video editing. The default value is Disabled.
 - **Erase:** This option will wipe out old data in VD to prevent that OS recognizes the old partition. The options are None, erase first 1GB or full disk. The default value is None.
 - **Type:** Select type for normal or backup usage. The options are RAID (for general usage) and Backup (for Clone or QReplica). The default value is RAID.
6. Click **OK** button to create the virtual disk.
 7. At the confirmation message, click **OK** button.

**TIP:**

- In AegisSAN Q500, the maximum number of virtual disks in a RAID group is 96. The maximum host number per virtual disk is 16. The maximum host number per controller is 64. The maximum virtual disk number in a system is 2048. The max virtual disk number for snapshot is 32.
- In AegisSAN F300Q / F400Q / P300Q / P500Q / S300Q, the maximum number of virtual disks in a RAID group is 96. The maximum host number per virtual disk is 16. The maximum host number per controller is 64. The maximum virtual disk number in a system is 1024. The max virtual disk number for snapshot is 16.
- In AegisSAN LX F600Q / P400Q / P600Q, the maximum number of virtual disks in a RAID group is 96. The maximum host number per virtual disk is 16. The maximum host number per controller is 128. The maximum virtual disk number in a system is 4096. The max virtual disk number for snapshot is 64.

**CAUTION:**

If shutdown or reboot the system when creating VD, the erase process will stop.

Snapshot

The **Snapshot** tab provides to create, modify, delete, or view the status of snapshot. The two drop-down lists at the top enable you to switch the virtual disks. The other is to change the drive size units (MB or GB).

Linked snapshot for VD: - VD-R0 - Show size unit as: (GB)

	No.	Name	Used(GB)	Status	Health	Exposure	Right	#LUN	Created time
OP	1	SnapVD-01	0	N/A	Good	No	N/A	N/A	Fri Aug 20 18:02:44 2010

Expose
Rollback
Delete

Set snapshot space Auto snapshot Take snapshot Cleanup snapshot

This table shows the column descriptions.

Column Name	Description
Name	Snapshot VD name.
Used (GB) or (MB)	The amount of snapshot space that has been used. The unit can be displayed in GB or MB.
Status	The status of snapshot: <ul style="list-style-type: none"> N/A: The snapshot is normal. Replicated: The snapshot is for clone or QReplica usage. Abort: The snapshot is over space and abort.
Health	The health of snapshot: <ul style="list-style-type: none"> Good: The snapshot is good. Failed: The snapshot fails.
Exposure	Snapshot VD is exposed or not.
Right	The right of snapshot: <ul style="list-style-type: none"> Read-write: The snapshot VD can be read / write. Read-only: The snapshot VD is read only.
#LUN	Number of LUN(s) that snapshot VD is attached.
Created time	Snapshot VD created time.

The options are available on this tab:

- **Set snapshot space:** Set snapshot space for preparing to take snapshots.
- **Auto snapshot:** Set auto snapshot on the virtual disk.
- **Take snapshot:** Take a snapshot on the virtual disk.
- **Cleanup snapshot:** Clean all snapshots of a VD and release the snapshot space.

The options are available after taking an snapshot:

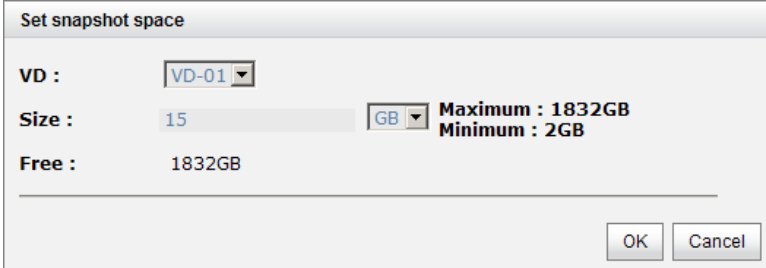
- **OP. -> Expose :** Expose the snapshot VD.
- **OP. -> Rollback:** Rollback the snapshot VD.
- **OP. -> Delete:** Delete the snapshot VD.

The options are available after exposing the snapshot VD:

- **OP. -> Unexpose:** Unexpose the snapshot VD.
- **OP. -> Attach:** Attach a LUN.
- **OP. -> Detach:** Detach a LUN.
- **OP. -> List LUN:** List attached LUN(s).

Take an example of taking a snapshot.

1. Create snapshot space first. Click **Set snapshot space** button.



Set snapshot space

VD : VD-01

Size : 15 GB Maximum : 1832GB
Minimum : 2GB

Free : 1832GB

OK Cancel

2. Enter the size which is reserved for the snapshot space.
3. Click **OK**. The snapshot space is created.
4. Click **Take snapshot** button.
5. Select a VD and enter a snapshot name.
6. Click **OK**. The snapshot is taken.

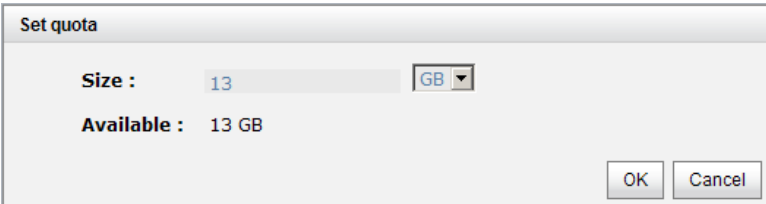
Linked snapshot for VD: - VD-R0 - Show size unit as: (GB)

	No.	Name	Used(GB)	Status	Health	Exposure	Right	#LUN	Created time
OP	1	SnapVD-01	0	N/A	Good	No	N/A	N/A	Fri Aug 20 18:02:44 2010

Expose
Rollback
Delete

Auto snapshot Take snapshot Cleanup snapshot

7. Expose the snapshot VD. Click **OP**. -> **Expose** option.



Set quota



Size : 13 GB

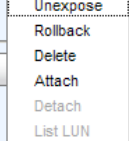
Available : 13 GB

OK Cancel

8. Enter a capacity for snapshot VD. If size is zero, the exposed snapshot VD will be read only. Otherwise, the exposed snapshot VD can be read / written, and the size will be the maximum capacity for writing.
9. Attach a LUN to a snapshot VD.

Linked snapshot for VD: - VD-R0 - Show size unit as: (GB)

	No.	Name	Used(GB)	Status	Health	Exposure	Right	#LUN	Created time
	1	SnapVD-01	0	N/A	Good	Yes	Read-only	0	Fri Aug 20 18:02:44 2010
	2	SnapVD-02	0	N/A	Good	Yes	Read-write	0	Fri Aug 20 18:04:54 2010


Auto snapshot
Take snapshot
Cleanup snapshot

10. Done. Snapshot VD can be used.





TIP:

- In AegisSAN Q500, the maximum snapshot number per virtual disk is 64.
- In AegisSAN F300Q / F400Q / P300Q / P500Q / S300Q, the maximum snapshot number per virtual disk is 32.
- In AegisSAN LX F600Q / P400Q / P600Q, the maximum snapshot number per virtual disk is 64.

Logical Unit

The **Logical unit** tab provides to attach, detach or view the status of logical unit numbers for each virtual disk. The following example shows the P400Q series.

	Host	Target	LUN	Permission	VD name	#Session
	*	0	0	Read-write	VD-01	0
	iqn.1991-05.com.microsoft:qsan	1	1	Read-write	VD-02	0

Detach

This table shows the column descriptions.

Column Name	Description
Host	The FC node name / iSCSI node name / SAS address for access control or a wildcard (*) for access by all hosts.
Target	The number of the target.
LUN	The number of the LUN assigned.
Permission	The permission level: <ul style="list-style-type: none"> • Read-write. • Read-only.
VD name	The name of the virtual disk assigned to this LUN.
#Session	The number of the active connection linked to the logical unit.
<i>(This option is only visible when the controller has</i>	

iSCSI ports.)

The options are available on this tab:

- **Attach:** Attach a logical unit number to a virtual disk.

The options are available after attaching a LUN:

- **OP. -> Detach:** Detach a logical unit number from a virtual disk.

Take an example of attaching a LUN on P400Q series.

1. Click the **Attach** button.



2. Select the Protocol. (F400Q only)
3. Select the Virtual Disk from the drop-down list.
4. Enter the host names with semicolons(;) or click **Add host** button to add one by one. Fill-in wildcard (*) for access by all hosts.
5. Select the Target number from the drop-down list.
6. Select the LUN number from the drop-down list.
7. Choose the Permission level.
8. Click **OK** button.

The matching rules of access control are followed from created time of the LUNs. The earlier created LUN is prior to the matching rules. For example: there are 2 LUN rules for the same VD, one is "*", LUN 0; and the other is "iqn.host1", LUN 1. The host "iqn.host2" can login successfully because it matches the rule 1.

Wildcard "*" and "?" are allowed in this field. "*" can replace any word. "?" can replace only one character. For example:

- “iqn.host?” -> “iqn.host1” and “iqn.host2” are accepted.
- “iqn.host*” -> “iqn.host1” and “iqn.host12345” are accepted.

This field cannot accept comma, so “iqn.host1, iqn.host2” stands a long string, not 2 iqns.

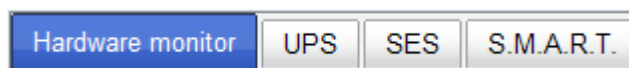


TIP:

- In AegisSAN Q500, the maximum LUN number is 2048.
- In AegisSAN F300Q / F400Q / P300Q / P500Q / S300Q, the maximum LUN number is 1024.
- In AegisSAN LX F600Q / P400Q / P600Q, the maximum LUN number is 4096.

Enclosure Management

The **Enclosure management** menu option is for accessing the **Hardware monitor**, **UPS**, **SES**, and **S.M.A.R.T.** option tabs.



For the enclosure management, there are many sensors for different purposes, such as temperature sensors, voltage sensors, hard disk status, fan sensors, power sensors, and LED status. Due to the different hardware characteristics among these sensors, they have different polling intervals. Below are the details of the polling time intervals:

- Temperature sensors: 1 minute.
- Voltage sensors: 1 minute.
- Hard disk sensors: 10 minutes.
- Fan sensors: 10 seconds . When there are 3 errors consecutively, system sends ERROR event log.
- Power sensors: 10 seconds, when there are 3 errors consecutively, system sends ERROR event log.
- LED status: 10 seconds.

Hardware Monitor

The **Hardware monitor** tab displays the information of current voltages and temperatures, provide an Auto shutdown option. The following example shows the P300Q series.

Hardware monitor
UPS
SES
S.M.A.R.T.

Show information for: - Local -

Controller 1

Type	Item	Value	Status
Voltage	Onboard +1.2V	+1.18 V (min = +1.08 V, max = +1.32 V)	OK
Voltage	Onboard +3.3V	+3.36 V (min = +3.04 V, max = +3.56 V)	OK
Voltage	Onboard +5V	+5.07 V (min = +4.60 V, max = +5.40 V)	OK
Voltage	Onboard +12V	+12.23 V (min = +11.04 V, max = +12.96 V)	OK
Voltage	Onboard +1.8V	+1.81 V (min = +1.62 V, max = +1.98 V)	OK
Temperature	Core Processor	+50.5 (C) (hyst = +0.0 (C), high = +80.0 (C))	OK
Temperature	iSCSI NIC 1	+43.0 (C) (hyst = +0.0 (C), high = +65.0 (C))	OK
Temperature	iSCSI NIC 2	+43.0 (C) (hyst = +0.0 (C), high = +65.0 (C))	OK
Temperature	SAS Controller	+46.0 (C) (hyst = +0.0 (C), high = +65.0 (C))	OK
Temperature	SAS Expander	+42.0 (C) (hyst = +0.0 (C), high = +65.0 (C))	OK

BPL

Type	Item	Value	Status
Voltage	PSU +5V	+5.02 V (min = +4.60 V, max = +5.40 V)	OK
Voltage	PSU +12V	+12.23 V (min = +11.04 V, max = +12.96 V)	OK
Voltage	PSU +3.3V	+3.39 V (min = +3.04 V, max = +3.56 V)	OK
Temperature	Location 1	+29.0 (C) (hyst = +0.0 (C), high = +42.0 (C))	OK
Temperature	Location 2	+32.0 (C) (hyst = +0.0 (C), high = +42.0 (C))	OK
Temperature	Location 3	+30.0 (C) (hyst = +0.0 (C), high = +42.0 (C))	OK
Power Supply	PSU1	N/A	OK
Power Supply	PSU2	N/A	OK
Power Supply	PSU3	N/A	OK
Cooling	FAN1	3308 RPM	OK
Cooling	FAN2	3515 RPM	OK
Cooling	FAN3	3375 RPM	OK
Cooling	FAN4	3013 RPM	OK

Controller 2

Type	Item	Value	Status
Voltage	Onboard +1.2V	+1.18 V (min = +1.08 V, max = +1.32 V)	OK
Voltage	Onboard +3.3V	+3.33 V (min = +3.04 V, max = +3.56 V)	OK
Voltage	Onboard +5V	+5.07 V (min = +4.60 V, max = +5.40 V)	OK
Voltage	Onboard +12V	+12.08 V (min = +11.04 V, max = +12.96 V)	OK
Voltage	Onboard +1.8V	+1.81 V (min = +1.62 V, max = +1.98 V)	OK
Temperature	Core Processor	+50.0 (C) (hyst = +0.0 (C), high = +80.0 (C))	OK
Temperature	iSCSI NIC 1	+39.0 (C) (hyst = +0.0 (C), high = +65.0 (C))	OK
Temperature	iSCSI NIC 2	+40.0 (C) (hyst = +0.0 (C), high = +65.0 (C))	OK
Temperature	SAS Controller	+42.0 (C) (hyst = +0.0 (C), high = +65.0 (C))	OK
Temperature	SAS Expander	+35.0 (C) (hyst = +0.0 (C), high = +65.0 (C))	OK

Auto shutdown : ☒

If 'Auto shutdown' has been checked, the system will shutdown automatically when voltage or temperature is out of the normal range.

Confirm

If **Auto shutdown** is enabled, the system will shutdown automatically when the voltage or temperature is out of the normal range. For better data protection, it is recommended to check **Auto Shutdown**.

For better protection and avoiding single short period of high temperature that could trigger an automatic shutdown, the system uses to gauge if a shutdown is needed. This is done using several sensors placed on key systems that the system checks every 30 seconds for present temperatures.

- The core processor temperature limit is 80°C.
- The interface temperature limit is 65°C.
- The SAS Controller and SAS Expander temperature limits are 65°C.

When one of these sensors reports a temperature above the threshold for three continuous minutes, the system shuts down automatically.

UPS

The **UPS** tab is used to set up a UPS (Uninterruptible Power Supply).

The system supports and communicates with smart-UPS of APC.
Choose Smart-UPS for APC, None for other vendors or no UPS.

UPS type :	Smart-UPS ▾
Shutdown battery level (%) :	5 ▾
Shutdown delay (s) :	30 ▾
Shutdown UPS :	ON ▾
Status :	Running
Battery level :	<div style="width: 100%; background-color: blue; height: 10px;"></div> 100%

Currently, the system only supports and communicates with Smart-UPS series by APC (American Power Conversion Corp, <http://www.apc.com/>) and Magatec UPS.



TIP:

Connection with other vendors of UPS can work well, but they have no such communication features with the system.

First, connect the system to UPS via the included cable for communication. (The cable plugs into the serial cable that comes with the UPS.) Then set up the shutdown values for when the power goes out.

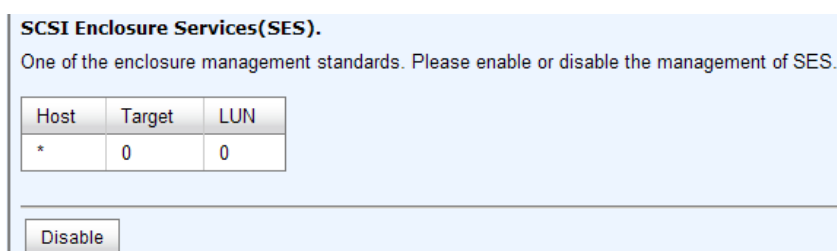
This table shows the available options and their descriptions.

Options	Description
UPS Type	Select UPS Type: <ul style="list-style-type: none"> None: No UPS or other vendors. Smart-UPS: APC UPS. Megatec-UPS: Megatec UPS.
Shutdown battery level (%)	When below the setting level, the system will shutdown. Setting level to "0" will disable UPS.
Shutdown delay (s)	If power failure occurs and system power can not recover after the time setting, the system will shutdown. Setting delay to "0" will disable the function.
Shutdown UPS	Select ON, when power is gone, UPS will shutdown by itself after the system shutdown successfully. After power comes back, UPS will start working and notify system to boot up. OFF will not.
Status	The status of UPS: <ul style="list-style-type: none"> Detecting... Running Unable to detect UPS Communication lost UPS reboot in progress UPS shutdown in progress Batteries failed. Please change them NOW!
Battery level (%)	Current power percentage of battery level.

The system will shutdown either **Shutdown battery level (%)** or **Shutdown delay (s)** reaches the condition. User should set these values carefully.

SES

The **SES** (SCSI Enclosure Services, one of the enclosure management standards) tab is used to enable or disable the management of SES.



Host	Target	LUN
*	0	0

Disable

The options are available on this tab:

- Enable:** Click the **Enable** button to enable SES.
- Disable:** Click the **Disable** button to disable SES.

The SES client software is available at the following web site:

SANtools: <http://www.santools.com/>

S.M.A.R.T.

S.M.A.R.T. (Self-Monitoring Analysis and Reporting Technology) is a diagnostic tool for hard drives to deliver warning of drive failures in advance. It provides users a chance to take actions before a possible drive failure.

Self-Monitoring Analysis and Reporting Technology(S.M.A.R.T).

A diagnostic tool for hard drives to deliver warning of drive failures in advance.
S.M.A.R.T. provides users chances to take actions before possible drive failure.

Show information for: - Local -

Slot	HDD type	Read error	Spin up	Reallocated sector	Seek error	Spin up	Calibration	Temperature
1	SATA	100(16)	101(24)	100(5)	100(67)	100(60)	N/A	28
2	SATA	100(16)	104(24)	100(5)	100(67)	100(60)	N/A	28
3	SATA	100(16)	98(24)	100(5)	100(67)	100(60)	N/A	27
4	SATA	100(16)	97(24)	100(5)	100(67)	100(60)	N/A	27
5	SATA	100(16)	104(24)	100(5)	100(67)	100(60)	N/A	28
6	SATA	100(16)	100(24)	100(5)	100(67)	100(60)	N/A	27
7	SATA	100(16)	99(24)	100(5)	100(67)	100(60)	N/A	27
8	SATA	100(16)	103(24)	100(5)	100(67)	100(60)	N/A	26

S.M.A.R.T. measures many attributes of the hard drive all the time and inspects the properties of hard drives which are close to be out of tolerance. The advanced notice of possible hard drive failure can allow users to back up hard drive or replace the hard drive. This is much better than hard drive crash when it is writing data or rebuilding a failed hard drive.

This tool displays S.M.A.R.T. information of hard drives. The number is the current value; the number in parenthesis is the threshold value. The threshold values from different hard drive vendors are different; please refer to hard drive vendors' specification for details.

S.M.A.R.T. only supports SATA drives. SAS drives do not have this function and will show N/A in the web page.

Self-Monitoring Analysis and Reporting Technology(S.M.A.R.T).

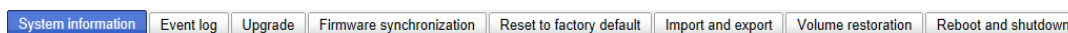
A diagnostic tool for hard drives to deliver warning of drive failures in advance.
S.M.A.R.T. provides users chances to take actions before possible drive failure.

Show information for: - Local -

Slot	HDD type	Read error	Spin up	Reallocated sector	Seek error	Spin up	Calibration	Temperature
1	SAS	N/A	N/A	N/A	N/A	N/A	N/A	38
2	SAS	N/A	N/A	N/A	N/A	N/A	N/A	39
3	SAS	N/A	N/A	N/A	N/A	N/A	N/A	38
4	SAS	N/A	N/A	N/A	N/A	N/A	N/A	39
5	SAS	N/A	N/A	N/A	N/A	N/A	N/A	38
6	SAS	N/A	N/A	N/A	N/A	N/A	N/A	38
7	SAS	N/A	N/A	N/A	N/A	N/A	N/A	35
8	SAS	N/A	N/A	N/A	N/A	N/A	N/A	33

System Maintenance

The **Maintenance** menu option is accessing the **System information**, **SAS topology** (This option is only visible in SAS front-end models.), **Event log**, **Upgrade**, **Firmware synchronization** (This option is only visible when dual controllers is installed.), **Reset to factory default**, **Import and export**, **Volume restoration** (This option is available in AegisSAN LX and AegisSAN Q500), and **Reboot and shutdown** option tabs.



System Information

The **System information** provides to display system information. It includes CPU type, installed system memory, firmware version, SAS IOC firmware no., SAS expander firmware no., serial numbers of the controller(s), controller hardware no., master controller, backplane ID, serial numbers of the connected JBOD(s), and system status and QReplca status.

Item	Information
CPU type	Intel(R) Xeon(R) CPU C3528 @ 1.73GHz
System memory	(Slot 1) ECC Unbuffered DDR-III 4096MB (Slot 2) ECC Unbuffered DDR-III 4096MB
Firmware version	P600H X.X.X
SAS IOC firmware no.	11.00.00.00
SAS expander firmware no.	Local (1100)
Serial number	001378B92180 (Controller 1 : 5001378005901F80 , Controller 2 : 5001378005903380)
Controller HW no.	Controller 1: 1.0 Controller 2: 1.0
Master Controller	Controller 1
Backplane ID	QX424
JBOD serial no.	No JBOD connected
Status	Normal
QReplca	Activated.
Download System Information	

This table shows the status descriptions.

Status	Description
Normal	Dual controllers and JBODs are in normal stage.
Degraded	One controller or JBOD fails or has been plugged out.
Lockdown	The firmware of two controllers is different or the size of memory of two controllers is different.
Single	Single controller mode.

The options are available on this tab:

- **Download System Information:** Download the system information for debug.



CAUTION:

If you try to increase the system memory and running in dual controller mode, please make sure both controllers have the same DIMM on each corresponding memory slot. Failing to do so will result in controller malfunction, which will not be covered by warranty.

SAS Topology (Only available in SAS frond-end models)

The **SAS topology** provides to display the SAS information. It includes Device, Type and SAS address.

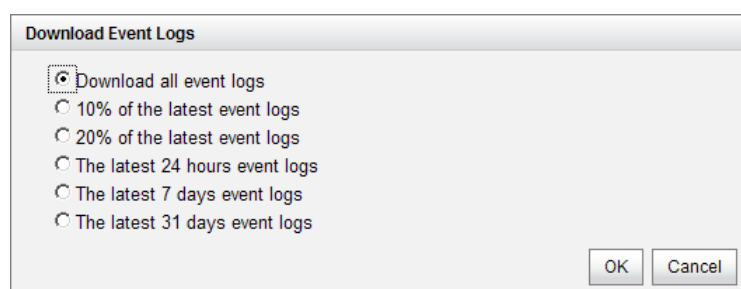
Device	Type	SAS address
1	SAS Target	5001378003E02C58
2	SAS Target	5001378003E02C59
3	SAS Target	5001378003E02C5A
4	SAS Target	5001378003E02C5B
5	SAS Target	5001378003E02C5C
6	SAS Target	5001378003E02C5D
7	SAS Target	5001378003E02C5E
8	SAS Target	5001378003E02C5F

Event log

The **Event log** tab provides a log or event messages. Choose the buttons of INFO, WARNING, or ERROR levels to display those particular events.

The options are available on this tab:

- **Download:** Click **Download** button to save the event log as a text file with file name “log-ModelName-SerialNumber-Date-Time.txt”. It will pop up a filter dialog as the following. The default it “Download all event logs”.



- **Mute:** Click **Mute** button to stop alarm if system alerts.
- **Clear:** Click **Clear** button to clear all event logs.

**TIP:**

Please plug-in any of the first four hard drives, then event logs can be saved and displayed in next system boot up. Otherwise, the event logs cannot be saved and would be disappeared.

Select event level of displayed event log

<< first < prev 1 2 3 4 5 6 7 8 9 10 next > last >>

Type	Time	Content
INFO	Fri, 03 Jun 2011 13:15:05	[CTR1] admin login from 192.168.8.91 via Web UI
INFO	Fri, 03 Jun 2011 11:49:01	[CTR1] admin login from 192.168.121.1 via Web UI
INFO	Thu, 02 Jun 2011 15:43:30	[CTR1] LUN 0 is attached to VD Datastore3.
INFO	Thu, 02 Jun 2011 15:43:02	[CTR1] LUN 0 is attached to VD Datastore2.
INFO	Thu, 02 Jun 2011 15:42:45	[CTR1] LUN 0 is attached to VD Datastore1.
INFO	Thu, 02 Jun 2011 15:42:27	[CTR1] LUN 0 is attached to VD Datastore4.
INFO	Thu, 02 Jun 2011 14:59:03	[CTR1] admin login from 192.168.8.91 via Web UI
INFO	Thu, 02 Jun 2011 14:15:46	[CTR2] VD Datastore3 completed initialization.
INFO	Thu, 02 Jun 2011 13:44:40	[CTR1] The snapshot space of VD Datastore1 is cleared
INFO	Thu, 02 Jun 2011 13:44:32	[CTR1] The snapshot VD 3 has been deleted.
INFO	Thu, 02 Jun 2011 13:39:05	[CTR2] VD Datastore3 has been created.
INFO	Thu, 02 Jun 2011 13:39:05	[CTR2] VD Datastore3 starts initialization.
INFO	Thu, 02 Jun 2011 13:38:45	[CTR2] Assign PD 9 to be the dedicated spare disk of RG DataStore3.
INFO	Thu, 02 Jun 2011 13:38:44	[CTR1] Disk 9 is inserted into system
WARNING	Thu, 02 Jun 2011 13:38:35	[CTR1] Disk 9 is removed from system
WARNING	Thu, 02 Jun 2011 13:38:35	[CTR2] RG DataStore3 is in degraded mode.
INFO	Thu, 02 Jun 2011 13:38:31	[CTR1] The preferred owner of RG DataStore3 has been changed to controller 2.
INFO	Thu, 02 Jun 2011 13:38:22	[CTR1] RG DataStore3 has been created.
INFO	Thu, 02 Jun 2011 13:22:32	[CTR1] admin login from 192.168.8.91 via Web UI
INFO	Thu, 02 Jun 2011 11:14:40	[CTR1] admin login from 192.168.136.11 via Web UI

<< first < prev 1 2 3 4 5 6 7 8 9 10 next > last >>

The event log is displayed in reverse order which means the latest event log is on the first / top page. The event logs are actually saved in the first four hard drives; each hard drive has one copy of event log. For one system, there are four copies of event logs to make sure users can check event log any time when there are failed disks.

Upgrade

The **Upgrade** tab is used to upgrade controller firmware, JBOD firmware, change operation mode, and activate QReplia license. Before upgrade, it's better to use **Export** function to backup all configurations to a file.

RAID Controller/System(s)	
Browse the firmware to upgrade :	<input type="text"/> Browse...
<input type="button" value="Confirm"/>	

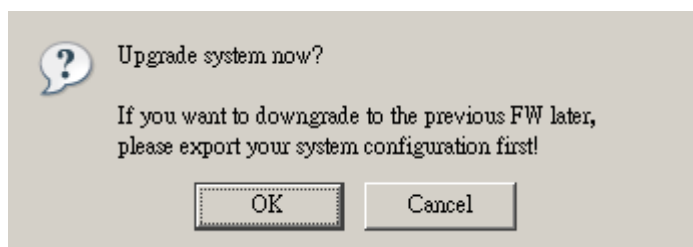
JBOD Controller/System(s)	
Choose a JBOD:	<input type="button" value="v"/>
Browse the firmware to upgrade:	<input type="text"/> Browse...
<input type="button" value="Confirm"/>	

Controller Mode	
Enter the MAC address for the mode setting:	<input type="text"/>
Operation mode:	<input type="button" value="Dual"/> <input type="button" value="v"/>
<input type="button" value="Confirm"/>	

QReplica license	
Select the license file to activate QReplica:	<input type="text"/> Browse...
<input type="button" value="Confirm"/>	

The options are available on this tab:

- **Controller firmware upgrade:** Please prepare new controller firmware file named “xxxx.bin” in local hard drive, then click **Browse** to select the file. Click **Confirm** button, it will pop up a warning message, click **OK** button to start upgrading the firmware.

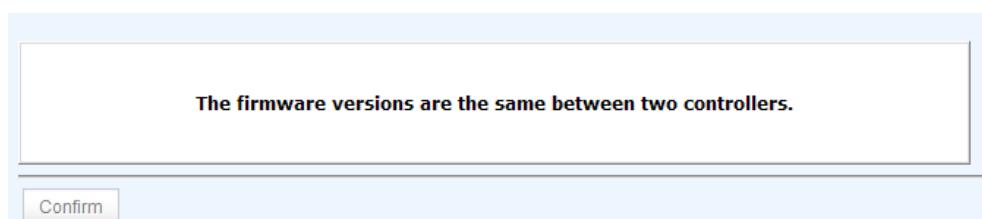


When upgrading, there is a progress bar running. After finished upgrading, the system must reboot manually to make the new firmware took effect.

- **JBOD firmware upgrade:** To upgrade JBOD firmware, the steps are the same as controller firmware but choosing number of JBOD first.
- **Controller mode:** This option can be modified to dual or single here. If the system install only one controller, switch this mode to **Single**. This mode indicates single upgradable. Enter the MAC address displayed in **System configuration -> Network setting** such as 001378xxxxxx (case-insensitive), and then click **Confirm** button.
- **QReplica license:** This option can activate QReplica function if there is a license here. Select the license file, and then click **Confirm** button.

Firmware Synchronization (Only available in Dual controller models)

The **Firmware synchronization** tab is used on dual controller systems to synchronize the controller firmware versions when the firmware of the master controller and the slave controller are different. The firmware of slave controller is always changed to match the firmware of the master controller. It doesn't matter if the firmware version of slave controller is newer or older than that of the master.



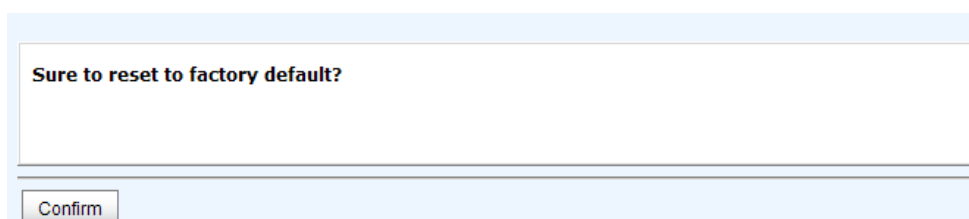
Normally, the firmware versions in both controllers are the same.

**TIP:**

This tab is only visible when the dual controllers are installed. A single controller system does not have this option.

Reset to Factory Default

The **Reset to factory default** tab allows users to reset the system configurations back to the factory default settings.

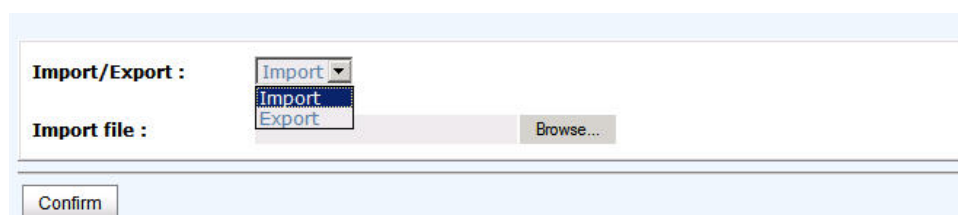


The default values are:

- Admin password: 1234
- IP address: DHCP

Import and Export

The **Import and export** is used to either save system configuration (export) or apply a saved configuration (import).



While the volume configuration settings are available for exporting, to prevent conflicts and overwriting existing data, they cannot be imported.

The options are available on this tab:

- **Import:** Import all system configurations excluding volume configuration.
- **Export:** Export all configurations to a file.



CAUTION:

Import option will import all system configurations excluding volume configuration and the current system configurations will be replaced.

Volume Restoration (Only available in AegisSAN LX)

The **Volume Restoration** can restore the volume configuration from the volume creation history. It is used for RAID group corrupt and tries to recreate the volume. When trying to do data recovery, the same volume configurations as original must be set and all member disks must be installed by the same sequence as original. Otherwise, data recovery will fail. The volume restoration does not guarantee that the lost data can be restored. Please get help from the expert before executing the function.

	RAID group name	RAID	VD name	Volume size (GB)	#PD	Physical disk slot	Time	Event log
OP.	QUICK50356	RAID 0	QUICK13159	1000	1	Local: 1	2013/10/23 16:08:13 CST	SNAP init
Restore	CK50356	RAID 0	QUICK13159	1000	1	Local: 1	2013/10/20 23:56:31 CST	Virtual disk created
OP.	R5	RAID 5	VD5	3725	3	Local: 1, 2, 3	2013/10/14 15:10:34 CST	Virtual disk created
OP.	test	RAID 0	test2	100	3	Local: 1, 2, 3	2013/10/09 18:01:52 CST	SNAP init
OP.	test	RAID 0	test	1000	3	Local: 1, 2, 3	2013/10/09 18:01:31 CST	SNAP init
OP.	test	RAID 0	test2	100	3	Local: 1, 2, 3	2013/10/09 18:01:24 CST	Virtual disk created
OP.	test	RAID 0	test	1000	3	Local: 1, 2, 3	2013/10/09 18:01:09 CST	Virtual disk created
OP.	test	RAID 0	test2	0	3	Local: 1, 2, 3	2013/10/09 17:59:27 CST	Virtual disk created
OP.	test	RAID 0	test	100	3	Local: 1, 2, 3	2013/10/09 17:45:12 CST	SNAP init
OP.	test	RAID 0	test	100	3	Local: 1, 2, 3	2013/10/09 17:45:07 CST	Virtual disk created
OP.	test	RAID 5	vd1	3725	3	Local: 1, 2, 3	2013/10/07 18:46:20 CST	Physical disk inserted
OP.	test	RAID 5	vd1	3725	2	Local: 1, 3	2013/10/07 18:43:13 CST	Physical disk removed

This table shows the column descriptions.

Column Name	Description
RAID group name	The original RAID group name.
RAID	The original RAID level.
VD name	The original virtual disk name.
Volume size (GB)	The original capacity of the virtual disk.
#PD	The original physical disk number of the RAID group.
Physical disk slot	The original physical disk locations.
Time	The last action time of the virtual disk.
Event log	The last event of the virtual disk.

The options are available on this tab:

- **Restore:** Restore the virtual disk of the RAID group.



TIP:

When trying to do data recovery, the same volume configurations as original must be set and all member disks must be installed by the same sequence as original. Otherwise, data recovery will fail.



CAUTION:

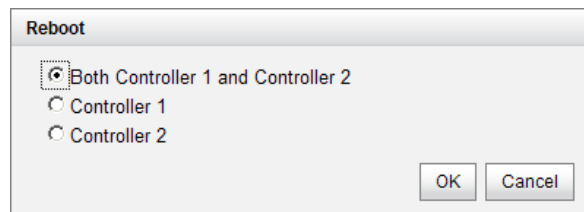
The data recovery does not guarantee that the lost data can be restored 100%. It depends on the real operation and the degree of physical damages on disks. Users will take their own risk to do these procedures.

Reboot and Shutdown

The **Reboot and shutdown** function is used to reboot or shutdown the system. Before powering off the system, it is highly recommended to execute **Shutdown** function to flush the data from cache onto the physical disks. The step is important for data protection.



The Reboot function has three options, reboot both controllers, controller 1 only or controller 2 only.



5

Advanced Operations

Volume Rebuild

If one physical disk of the RG which is set as protected RAID level (e.g.: RAID 3, RAID 5, or RAID 6) is FAILED or has been unplugged / removed, then the status of RG is changed to degraded mode, the system will search/detect spare disk to rebuild the degraded RG to a complete one. It will detect dedicated spare disk as rebuild disk first, then global spare disk.

The following examples are scenarios for a RAID 6.

1. When there is no global spare disk or dedicated spare disk in the system, The RG will be in degraded mode and wait until (1) there is one disk assigned as spare disk, or (2) the failed disk is removed and replaced with new clean disk, then the Auto-Rebuild starts. The new disk will be a spare disk to the original RG automatically. If the new added disk is not clean (with other RG information), it would be marked as RS (reserved) and the system will not start "auto-rebuild". If this disk is not belonging to any existing RG, it would be FR (Free) disk and the system will start Auto-Rebuild. If user only removes the failed disk and plugs the same failed disk in the same slot again, the auto-rebuild will start running. But rebuilding in the same failed disk may impact customer data if the status of disk is unstable. QSAN suggests all customers not to rebuild in the failed disk for better data protection.
2. When there is enough global spare disk(s) or dedicated spare disk(s) for the degraded array, system starts Auto-Rebuild immediately. And in RAID 6, if there is another disk failure occurs during rebuilding, system will start the above Auto-Rebuild process as well. Auto-Rebuild feature only works at that the status of RG is "Online". It will not work at "Offline". Thus, it will not conflict with the "Online roaming" feature.
3. In degraded mode, the status of RG is "Degraded". When rebuilding, the status of RG / VD will be "Rebuild", the column "R%" in VD will display the ratio in percentage. After complete rebuilding, the status will become "Online". RG will become completely one.

**TIP:**

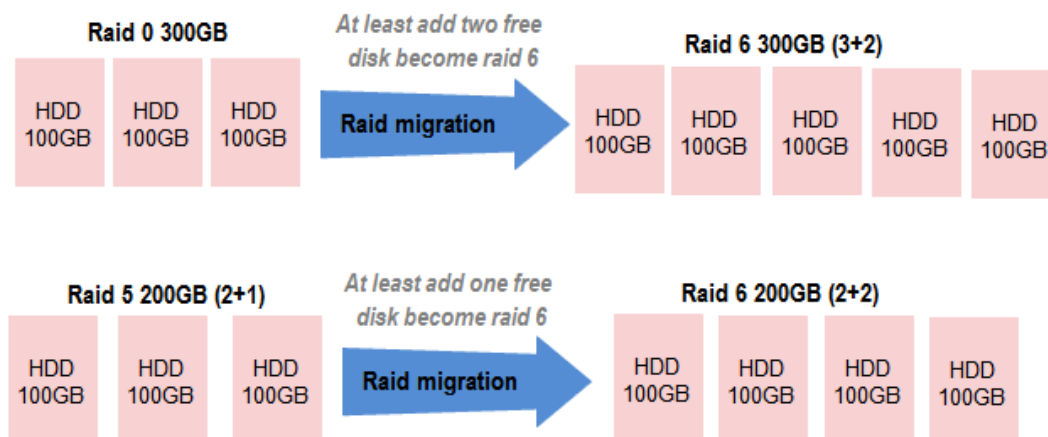
If there is no RG or only a RG of RAID 0 or JBOD level, set dedicated spare is not available. Because user can not set dedicated spare disk to RAID 0 or JBOD.

Sometimes, rebuild is called recover; they are the same meaning. This table describes the relationship between RAID levels and a rebuild (recovery).

Operation	Description
RAID 0	Disk striping. No protection for data. RG fails if any hard drive fails or unplugs.
RAID 1	Disk mirroring over 2 disks. RAID 1 allows one hard drive fails or unplugging. Need one new hard drive to insert to the system and rebuild to be completed.
N-way mirror	Extension to RAID 1 level. It has N copies of the disk. N-way mirror allows N-1 hard drives failure or unplugging.
RAID 3	Striping with parity on the dedicated disk. RAID 3 allows one hard drive failure or unplugging.
RAID 5	Striping with interspersed parity over the member disks. RAID 5 allows one hard drive failure or unplugging.
RAID 6	2-dimensional parity protection over the member disks. RAID 6 allows two hard drives failure or unplugging. If it needs to rebuild two hard drives at the same time, it will rebuild the first one, then the other in sequence.
RAID 0+1	Mirroring of RAID 0 volumes. RAID 0+1 allows two hard drive failures or unplugging, but at the same array.
RAID 10	Striping over the member of RAID 1 volumes. RAID 10 allows two hard drive failure or unplugging, but in different arrays.
RAID 30	Striping over the member of RAID 3 volumes. RAID 30 allows two hard drive failure or unplugging, but in different arrays.
RAID 50	Striping over the member of RAID 5 volumes. RAID 50 allows two hard drive failures or unplugging, but in different arrays.
RAID 60	Striping over the member of RAID 6 volumes. RAID 60 allows four hard drive failures or unplugging, every two in different arrays.
JBOD	The abbreviation of "Just a Bunch Of Disks". No data protection. RG fails if any hard drive failures or unplugs.

RAID Group Migration and Moving

To do migration, the total size of RG must be larger or equal to the original RG. It does not allow expanding the same RAID level with the same hard disks of original RG. There is a similar function **Move** which will move the member disks of RG to totally different physical disks. Take examples as following.



The below operations are not allowed when a RG is being migrated or moved. System would reject these operations:

1. Add dedicated spare.
2. Remove a dedicated spare.
3. Create a new VD.
4. Delete a VD.
5. Extend a VD.
6. Scrub a VD.
7. Perform another migration operation.
8. Scrub entire RG.
9. Take a snapshot.
10. Delete a snapshot.
11. Expose a snapshot.
12. Rollback to a snapshot.



TIP:

Migrate function will migrate the member disks of RG to the same physical disks but it should increase the number of disks or it should be different RAID level. Move function will move the member disks of RG to totally different physical disks.



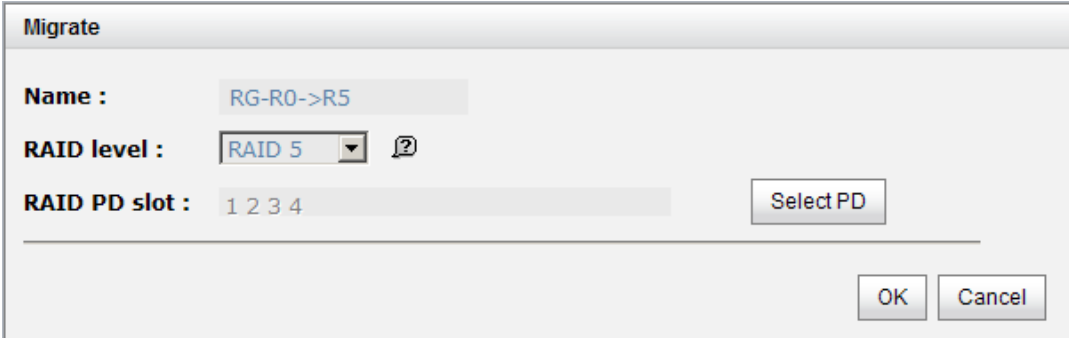
CAUTION:

RG migration or moving cannot be executed during rebuilding or VD extension.

To migrate the RAID level, please follow below procedures.

1. Select **Volume configuration -> RAID group**.
2. Select a RG, and then click **OP. -> Migrate**.

- Change the RAID level by clicking the down arrow to RAID 5. There will be a pop-up which indicates that HDD is not enough to support the new setting of RAID level, click **Select PD** to increase hard drives, then click **OK** to go back to setup page. When doing migration to lower RAID level, such as the original RAID level is RAID 6 and user wants to migrate to RAID 0, system will evaluate whether this operation is safe or not, and appear a warning message of “Sure to migrate to a lower protection array?”.



Migrate

Name : RG-R0->R5

RAID level : RAID 5 ?

RAID PD slot : 1 2 3 4 Select PD

OK Cancel

- Double check the setting of RAID level and RAID PD slot. If there is no problem, click **OK** button.
- Finally a confirmation page shows the detail of RAID information. If there is no problem, click **OK** button to start migration. System also pops up a message of “Warning: power lost during migration may cause damage of data!” to give user warning. When the power is abnormally off during the migration, the data is in high risk.
- Migration starts and it can be seen from the status of a RG. In **Volume configuration -> Virtual disk**, it displays the status “Migrating” and the complete percentage of migration in R%.

The following is an example of A RAID 0 with 3 physical drives migration to RAID5 with 4 physical drives.

Show size unit as: (GB)

	Name	Total(GB)	Free(GB)	#PD	#VD	Status	Health	RAID	Current owner	Preferred owner
OP	RG-R0->R5	1396	1386	4	1	Migrating	Good	RAID 5	Controller 1	Controller 1

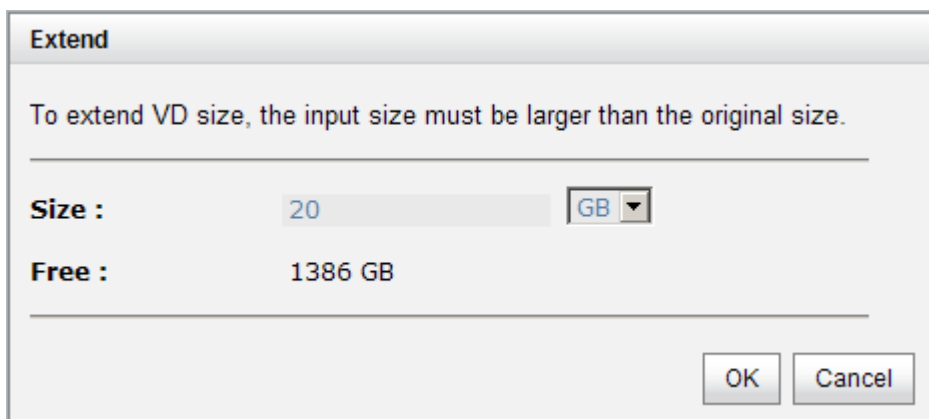
Show size unit as: (GB)

	Name	Size(GB)	Write	Priority	Bg rate	Type	Clone	Schedule	Status	Health	R %	RAID	#LUN	Snapshot space(GB)	#Snapshot	RG
OP	VD-R0->R5	10	WB	HI	4	RAID	N/A	N/A	Migrating	Optimal	3	RAID 5	0	0/0	0	RG-R0->R5

Virtual Disk Extension

To extend the VD size, please follow the procedures.

1. Select **Volume configuration -> Virtual disk**.
2. Select a VD, and then click **OP.** -> **Extend**.
3. Change the size. The size must be larger than the original, and then click **OK** button to start extension.



Extend

To extend VD size, the input size must be larger than the original size.

Size : 20 GB

Free : 1386 GB

OK Cancel

4. Extension starts. If the VD needs initialization, it will display the status “Initiating” and the complete percentage of initialization in R%.

Show size unit as: (GB)

	Name	Size(GB)	Write	Priority	Bg rate	Type	Clone	Schedule	Status	Health	R %	RAID	#LUN	Snapshot space(GB)	#Snapshot	RG
OP	VD-R0->R5	20	WB	HI	4	RAID	N/A	N/A	Initiating	Optimal	46	RAID 5	0	0/0	0	RG-R0->R5



TIP:

The size of VD extension must be larger than original.



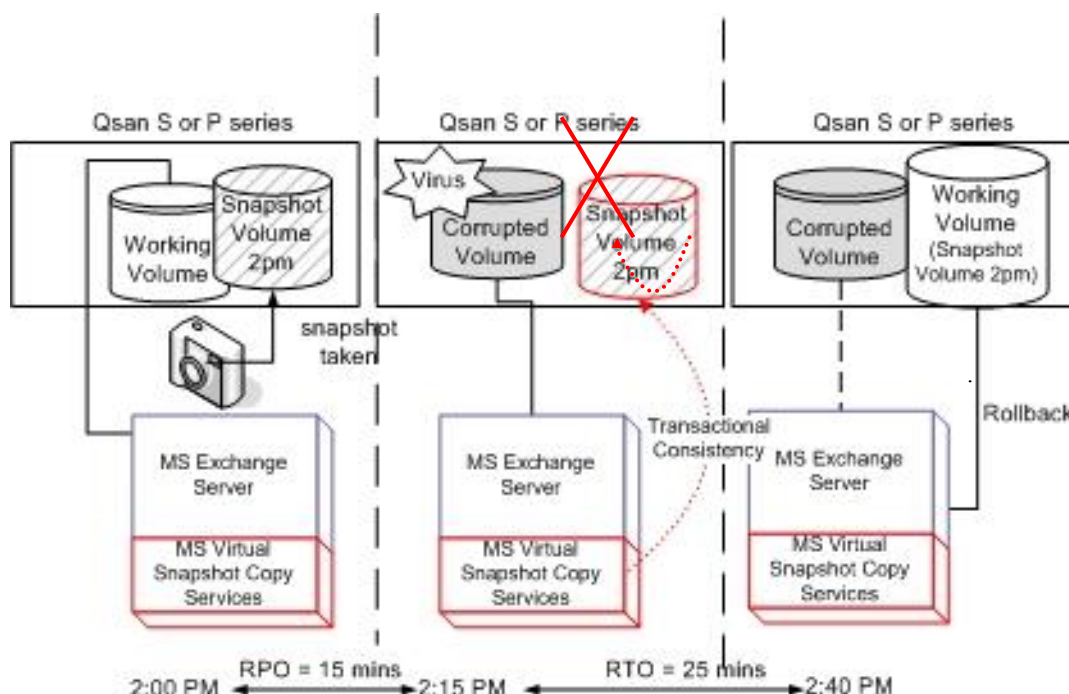
CAUTION:

VD extension cannot be executed during rebuilding or migration.

QSnap

Snapshot-on-the-box (QSnap) captures the instant state of data in the target volume in a logical sense. The underlying logic is Copy-on-Write -- moving out the data which would be written to certain location where a write action occurs since the time of data capture. The certain location, named as “Snap VD”, is essentially a new VD which can be attached to a LUN provisioned to a host as a disk like other ordinary VDs in the system. Rollback restores the data back to the state of any time which was previously captured in case for any unfortunate reason it might be (e.g. virus

attack, data corruption, human errors and so on). Snap VD is allocated within the same RG in which the snapshot is taken, we suggest to reserve 20% of RG size or more for snapshot space. Please refer to the following figure for snapshot concept.



Create a Snapshot Volume

To take a snapshot of the data, please follow the procedures.

1. Select **Volume configuration -> Virtual disk**.
2. Select a VD. And then click **OP. -> Set snapshot space**.
3. Enter a number for snapshot volume. The minimum size is suggested to be **20%** of VD size, and then click **OK** button. It will go back to the VD page and the size will show in snapshot column. It may not be the same as the number entered because some size is reserved for snapshot internal usage. There will be 2 numbers in **Snapshot** column. These numbers mean Used snapshot space and Total snapshot space.
4. There are two methods to take snapshot. In **Volume configuration -> Virtual disk**, select the VD, and then click **OP. -> Take snapshot**. Or in **Volume -> configuration -> Snapshot**, click **Take snapshot** button.
5. Enter a snapshot name, and then click **OK** button. A snapshot VD is created.
6. Select **Volume configuration -> Snapshot** to display all snapshot VDs taken from the VD.

Linked snapshot for VD: - VD-R0 - Show size unit as: (GB)

	No.	Name	Used(GB)	Status	Health	Exposure	Right	#LUN	Created time
OP	1	SnapVD-01	0	N/A	Good	No	N/A	N/A	Fri Aug 20 18:02:44 2010

Expose
Rollback
Delete

Auto snapshot Take snapshot Cleanup snapshot

- Check the gray button next to the Snapshot VD number; click **Expose**. Enter a capacity for snapshot VD. If size is zero, the exposed snapshot VD is read only. Otherwise, the exposed snapshot VD can be read / written, and the size is the maximum capacity for writing.
- Attach a LUN to the snapshot VD. Please refer to the previous chapter for attaching a LUN.
- Done. It can be used as a disk.

Linked snapshot for VD: - VD-R0 - Show size unit as: (GB)

	No.	Name	Used(GB)	Status	Health	Exposure	Right	#LUN	Created time
OP	1	SnapVD-01	0	N/A	Good	Yes	Read-only	0	Fri Aug 20 18:02:44 2010
OP	2	SnapVD-02	0	N/A	Good	Yes	Read-write	0	Fri Aug 20 18:04:54 2010

Unexpose
Rollback
Delete
Attach
Detach
List LUN

Auto snapshot Take snapshot Cleanup snapshot

To clean the snapshots, please follow the procedures.

- There are two methods to clean all snapshots. In **Volume configuration -> Virtual disk**, select the VD, and then click **OP. -> Cleanup snapshot**. Or in **Volume configuration -> Snapshot**, click **Cleanup** button.
- Cleanup snapshot** will delete all snapshots of the VD and release snapshot space.

Auto Snapshot

The snapshot copies can be taken manually or by schedule such as hourly or daily. Please follow the procedures.

- There are two methods to set auto snapshot. In **Volume configuration -> Virtual disk**, check the gray button next to the VD number; click **Auto snapshot**. Or in **Volume configuration -> Snapshot**, click **Auto snapshot** button.
- The auto snapshot can be set monthly, weekly, daily, or hourly.
- Done. It will take snapshots automatically.

Auto snapshot

- VD-R0->R5 -

Months to take snapshots :

☒ All
☒ 01 ☒ 02 ☒ 03 ☒ 04
☒ 05 ☒ 06 ☒ 07 ☒ 08
☒ 09 ☒ 10 ☒ 11 ☒ 12

Weeks to take snapshots :

☐ All
☐ 1 ☐ 2 ☐ 3 ☐ 4
☐ 5

Days to take snapshots :

☐ All
☐ Sun ☐ Mon ☐ Tue ☐ Wed
☐ Thu ☐ Fri ☐ Sat

Hours to take snapshots :

☐ All
☐ 00 ☐ 01 ☐ 02 ☐ 03
☐ 04 ☐ 05 ☐ 06 ☐ 07
☐ 08 ☐ 09 ☐ 10 ☐ 11
☐ 12 ☐ 13 ☐ 14 ☐ 15
☐ 16 ☐ 17 ☐ 18 ☐ 19
☐ 20 ☐ 21 ☐ 22 ☐ 23

OK

Cancel

**TIP:**

Daily snapshot will be taken at every 00:00. Weekly snapshot will be taken every Sunday 00:00. Monthly snapshot will be taken every first day of month 00:00.

Rollback

The data in snapshot VD can rollback to original VD. Please follow the procedures.

1. Select **Volume configuration -> Snapshot**.
2. Check the gray button next to the Snap VD number which user wants to rollback the data; click **Rollback**.
3. Done, the data in snapshot VD is rollback to original VD.

**CAUTION:**

Before executing rollback, it is better to dismount file system for flushing data from cache to disks in OS first. System sends pop-up message when user executes rollback function.

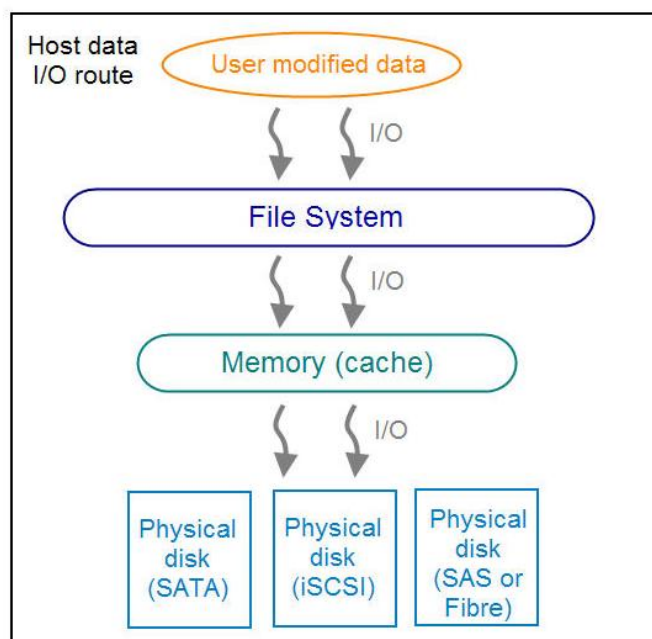
QSnap Constraint

Qsan snapshot function applies Copy-on-Write technique on VD and provides a quick and efficient backup methodology. When taking a snapshot, it does not copy any data at first time until a request of data modification comes in. The snapshot copies the original data to snapshot space and then overwrites the original data with new changes. With this technique, snapshot only copies the changed data instead of copying whole data. It will save a lot of disk space.

Create a data-consistent snapshot

Before using snapshot, user has to know why sometimes the data corrupts after rollback of snapshot. Please refer to the following diagram.

When user modifies the data from host, the data will pass through file system and memory of the host (write caching). Then the host will flush the data from memory to physical disks, no matter the disk is local disk (IDE or SATA), DAS (SCSI or SAS), or SAN (fibre or iSCSI). From the viewpoint of storage device, it can not control the behavior of host side. This case maybe happens. If user takes a snapshot, some data is still in memory and not flush to disk. Then the snapshot may have an incomplete image of original data. The problem does not belong to the storage device. To avoid this data inconsistent issue between snapshot and original data, user has to make the operating system flush the data from memory of host (write caching) into disk before taking snapshot.



On Linux and UNIX platform, a command named **sync** can be used to make the operating system flush data from write caching into disk. For Windows platform, Microsoft also provides a tool –

sync, which can do exactly the same thing as the **sync** command in Linux/UNIX. It will tell the OS to flush the data on demand. For more detail about **sync** tool, please refer to: <http://technet.microsoft.com/en-us/sysinternals/bb897438.aspx>

Besides the **sync** tool, Microsoft develops **VSS** (volume shadow copy service) to prevent this issue. VSS is a mechanism for creating consistent point-in-time copies of data known as shadow copies. It is a coordinator between backup software, application (SQL or Exchange...) and storages to make sure the snapshot without the problem of data-inconsistent. For more detail about the VSS, please refer to <http://technet.microsoft.com/en-us/library/cc785914.aspx>. Qsan storage system can support Microsoft VSS.

What if the snapshot space is over?

Before using snapshot, a snapshot space is needed from RG capacity. After a period of working snapshot, what if the snapshot size over the snapshot space of user defined? There are two different situations:

1. If there are two or more snapshots existed, the system will try to remove the oldest snapshots (to release more space for the latest snapshot) until enough space is released.
2. If there is only one snapshot existed, the snapshot will fail. Because the snapshot space is run out.

For example, there are two or more snapshots existed on a VD and the latest snapshot keeps growing. When it comes to the moment that the snapshot space is run out, the system will try to remove the oldest snapshot to release more space for the latest snapshot usage. As the latest snapshot is growing, the system keeps removing the old snapshots. When it comes that the latest snapshot is the only one in system, there is no more snapshot space which can be released for incoming changes, then snapshot will fail.

How many snapshots can be created on a VD

There are up to 32 snapshots can be created on a VD. What if the 33rd snapshot has been taken? There are two different situations:

1. If the snapshot is configured as auto snapshot, the latest one (the 33rd snapshot) will replace the oldest one (the first snapshot) and so on.
2. If the snapshot is taken manually, when taking the 33rd snapshot will fail and a warning message will be showed on Web UI.

Rollback / Delete snapshot

When a snapshot has been rollbacked, the other snapshots which are earlier than it will also be removed. But the rest snapshots will be kept after rollback. If a snapshot has been deleted, the

other snapshots which are earlier than it will also be deleted. The space occupied by these snapshots will be released after deleting.

Disk Roaming

Physical disks can be re-sequenced in the same system or move all physical disks in the same RAID group from system-1 to system-2. This is called disk roaming. System can execute disk roaming online. Please follow the procedures.

1. Select **Volume configuration -> RAID group**.
2. Check **OP. -> Deactivate**.
3. Move all PDs of the RG to another system.
4. Check **OP. -> Activate**.
5. Done.

Disk roaming has some constraints as described in the followings:

1. Check the firmware version of two systems first. It is better that either systems have the same firmware version or system-2 firmware version is newer.
2. All physical disks of the RG should be moved from system-1 to system-2 together. The configuration of both RG and VD will be kept but LUN configuration will be cleared in order to avoid conflict with system-2's original setting.

Virtual Disk Clone

The user can use VD clone function to backup data from source VD to target VD, set up backup schedule, and deploy the clone rules.

The procedures of VD clone are on the following:

1. Copy all data from source VD to target VD at the beginning (full copy).
2. Use QSnap technology to perform the incremental copy afterwards. Please be fully aware that the incremental copy needs to use snapshot to compare the data difference. Therefore, the enough snapshot space for VD clone is very important.

The following contents will take an example of a RAID 5 virtual disk (SourceVD_Raid5) clone to RAID 6 virtual disk (TargetVD_Raid6).

Start a VD clone

1. Create a RAID group (RG) in advance.

Show size unit as: (GB) ▼

	Name	Total(GB)	Free(GB)	#PD	#VD	Status	Health	RAID	Current owner	Preferred owner
OP.	RG-R5	931	931	3	0	Online	Good	RAID 5	Controller 1	Controller 1
OP.	RG-R6	931	931	4	0	Online	Good	RAID 6	Controller 1	Controller 1

2. Create two virtual disks (VD) SourceVD_R5 and TargetVD_R6. The raid type of backup target needs to be set as BACKUP.

Create

Name : TargetVD_R6

RG name : RG-R6 ▼

Capacity : 20 GB ▼

Stripe height (KB) : 64 ▼

Block size (B) : 512 ▼

Read/Write : ☐ Write-through cache ☒ Write-back cache ⓘ

Priority : ☒ High priority ☐ Middle priority ☐ Low priority

Bg rate : 4 ⓘ

Readahead : Enabled ⓘ

AV-media mode : Disabled ▼

Erase : None ▼

Type :
 RAID
 BACKUP

OK Cancel

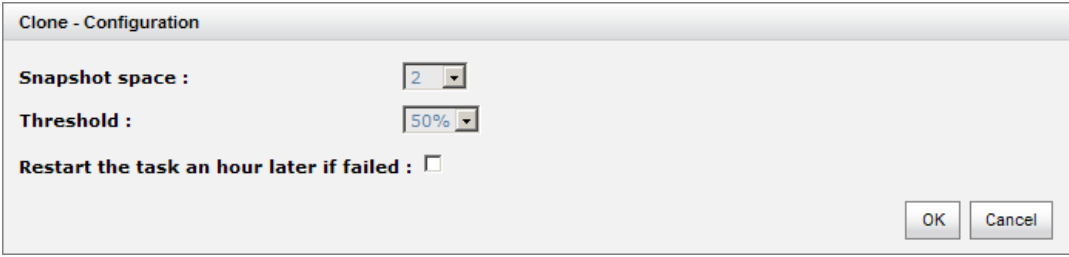
Here are the objects, a Source VD and a Target VD. Before starting clone process, it needs to deploy the VD Clone rule first. Click **Configuration** button.

Show size unit as: (GB) ▼

	Name	Size(GB)	Write	Priority	Bg rate	Type	Clone	Schedule	Status	Health	R %	RAID	#LUN	Snapshot space(GB)	#Snapshot	RG
OP.	SourceVD_R5	20	WB	Hi	4	RAID	N/A	N/A	Online	Optimal		RAID 5	0	0/0	0	RG-R5
OP.	TargetVD_R6	20	WB	Hi	4	BACKUP	N/A	N/A	Online	Optimal		RAID 6	0	0/0	0	RG-R6

Create Configuration

3. There are three clone configurations, described on the following.



Clone - Configuration

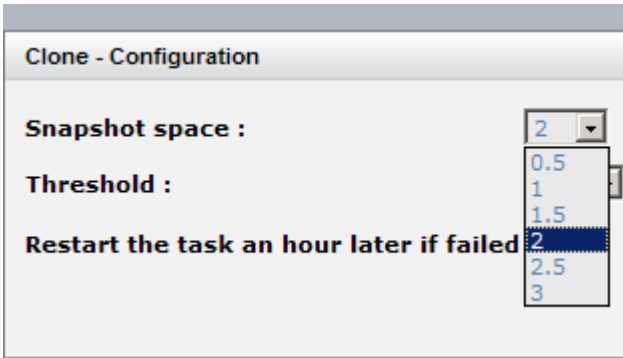
Snapshot space : 2

Threshold : 50%

Restart the task an hour later if failed : ☐

OK Cancel

- **Snapshot space**



Clone - Configuration

Snapshot space : 2

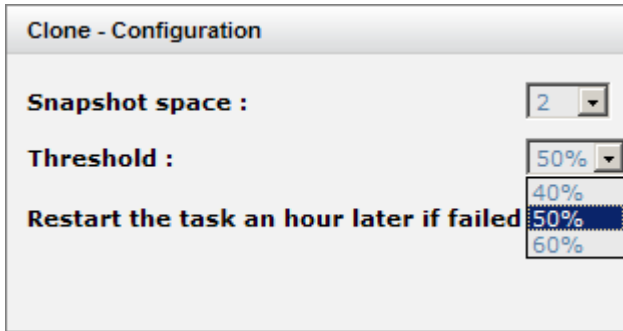
Threshold :

Restart the task an hour later if failed

0.5
1
1.5
2
2.5
3

This setting is the ratio of source VD and snapshot space. The default ratio is 2 to 1. It means when the clone process is starting, the system will automatically use the free RG space to create a snapshot space which capacity is double the source VD.

- **Threshold (The setting will be effective after enabling schedule clone)**



Clone - Configuration

Snapshot space : 2

Threshold : 50%

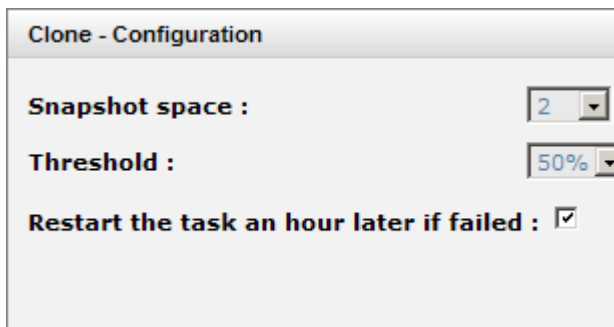
Restart the task an hour later if failed

40%
50%
60%

The threshold setting will monitor the usage amount of snapshot space. When the used snapshot space achieves its threshold, system will automatically take a clone snapshot and start VD clone process. The purpose of threshold could prevent the incremental copy fail immediately when running out of snapshot space. For example, the default threshold is 50%. The system will check the snapshot space every hour. When the snapshot space is used over 50%, the system will synchronize the source VD and target VD automatically.

Next time, when the rest snapshot space has been used 50%, in other words, the total snapshot space has been used 75%, the system will synchronize the source VD and target VD again.

- **Restart the task an hour later if failed (The setting will be effective after enabling schedule clone)**



The image shows a 'Clone - Configuration' dialog box. It contains three settings: 'Snapshot space :' with a dropdown menu showing '2', 'Threshold :' with a dropdown menu showing '50%', and 'Restart the task an hour later if failed :' with a checked checkbox.

When running out of snapshot space, the VD clone process will be stopped because there is no more available snapshot space. If this option has been checked, system will clear the snapshots of clone in order to release snapshot space automatically, and the VD clone will restart the task after an hour. This task will start a full copy.

**CAUTION:**

The default snapshot space allocated by the system is two times the size of source virtual disk. That is the best value of our suggestion. If user sets snapshot space by manually and lower than the default value, user should take the risk if the snapshot space is not enough and VD clone job will fail.

4. After deploying the VD clone rule, the VD clone process can be started now. Firstly, Click **Set clone** to set the target VD at the VD name SourceVD_R5.

Show size unit as: (GB) ▼

	Name	Size(GB)	Write	Priority	Bg rate	Type	Clone	Schedule
OP.	SourceVD_R5	20	WB	HI	4	RAID	N/A	N/A
		20	WB	HI	4	BACKUP	N/A	N/A

- Extend
- Parity check
- Delete
- Set property
- Attach LUN
- Detach LUN
- List LUN
- Set clone**
- Set snapshot space
- Cleanup snapshot
- Take snapshot
- Auto snapshot
- List snapshot
- More information

5. Select the target VD. Then click **Confirm** button.

Select target VD

Select target VD : TargetVD_R6 ▼

OK Cancel

6. Now, the clone target TargetVD_R6 has been set.

Show size unit as: (GB) ▼

	Name	Size(GB)	Write	Priority	Bg rate	Type	Clone	Schedule
OP.	SourceVD_R5	20	WB	HI	4	RAID	TargetVD_R6	N/A
OP.	TargetVD_R6	20	WB	HI	4	BACKUP	N/A	N/A

7. Click **OP.** -> **Start clone**, the clone process will start.

Show size unit as: (GB) ▾

	Name	Size(GB)	Write	Priority	Bg rate	Type	Clone	Schedule
OP.	SourceVD_R5	20	WB	HI	4	RAID	TargetVD_R6	N/A
		20	WB	HI	4	BACKUP	N/A	N/A

Extend
 Parity check
 Clear clone
Start clone
 Stop clone
 Schedule clone
 Delete
 Set property
 Attach LUN
 Detach LUN
 List LUN
 Set snapshot space
 Cleanup snapshot
 Take snapshot
 Auto snapshot
 List snapshot
 More information

8. The default setting will create a snapshot space automatically which the capacity is double size of the VD space. Before starting clone, system will initiate the snapshot space.

Show size unit as: (GB) ▾

	Name	Size(GB)	Write	Priority	Bg rate	Type	Clone	Schedule	Status	Health	R %	RAID	#LUN	Snapshot space(GB)	#Snapshot	RG
OP.	SourceVD_R5	20	WB	HI	4	RAID	TargetVD_R6	N/A	Initiating	Optimal	33	RAID 5	0	1/41	1	RG-R5
OP.	TargetVD_R6	20	WB	HI	4	BACKUP	N/A	N/A	Online	Optimal		RAID 6	0	0/0	0	RG-R6

9. After initiating the snapshot space, it will start cloning.

Show size unit as: (GB) ▾

	Name	Size(GB)	Write	Priority	Bg rate	Type	Clone	Schedule	Status	Health	R %	RAID	#LUN	Snapshot space(GB)	#Snapshot	RG
OP.	SourceVD_R5	20	WB	HI	4	RAID	TargetVD_R6	N/A	Cloning	Optimal	37	RAID 5	0	1/41	1	RG-R5
OP.	TargetVD_R6	20	WB	HI	4	BACKUP	N/A	N/A	Online	Optimal		RAID 6	0	0/0	0	RG-R6

10. Click **Schedule clone** to set up the clone by schedule.

Show size unit as: (GB)

	Name	Size(GB)	Write	Priority	Bg rate	Type	Clone	Schedule
OP.	SourceVD_R5	20	WB	HI	4	RAID	TargetVD_R6	N/A
		20	WB	HI	4	BACKUP	N/A	N/A

Context menu for SourceVD_R5:

- Extend
- Parity check
- Clear clone
- Start clone
- Stop clone
- Schedule clone**
- Delete
- Set property
- Attach LUN
- Detach LUN
- List LUN
- Set snapshot space
- Cleanup snapshot
- Take snapshot
- Auto snapshot
- List snapshot
- More information

11. There are **Set Clone schedule** and **Clear Clone schedule** in this page. Please remember that Threshold and Restart the task an hour later if failed options in VD configuration will take effect after clone schedule has been set.

Clone - Set Clone schedule

☒ **Set Clone schedule**

Scheduled time : 00:00

☒ **Back up everyday**

☐ **Back up on a selected day in a week**

☐ Sunday
 ☐ Monday
 ☐ Tuesday
 ☐ Wednesday
 ☐ Thursday
 ☐ Friday
 ☐ Saturday

☐ **Back up on the 1st day in a month**

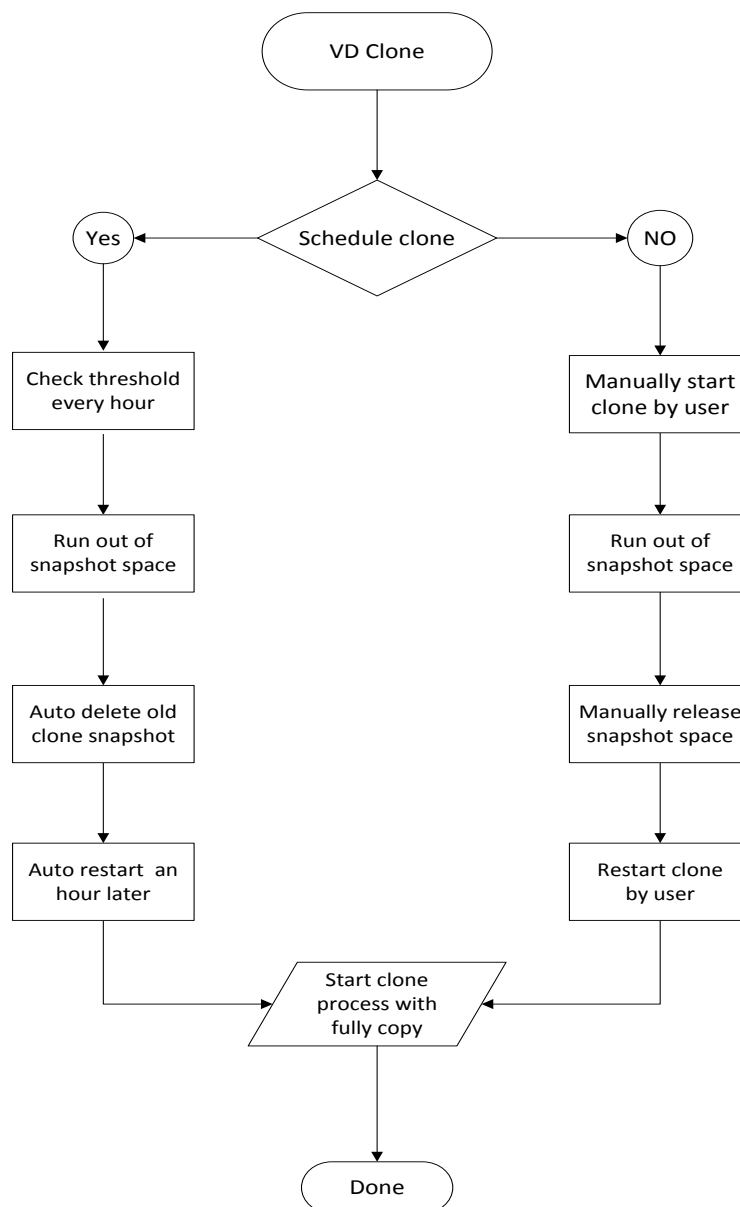
☐ **Clear Clone schedule**

OK Cancel

Run out of snapshot space while VD clone

While the clone is processing, the increment data of this VD is over the snapshot space. The clone will complete, but the clone snapshot will fail. Next time, when trying to start clone, it will get a warning message "This is not enough of snapshot space for the operation". At this time, the user needs to clean up the snapshot space in order to operate the clone process. Each time the clone snapshot failed, it means that the system loses the reference value of incremental data. So it will start a full copy at next clone process.

When running out of snapshot space, the flow diagram of VD clone procedure will be like the following.



SAS JBOD Expansion

Qsan storage space can be expanded by adding JBOD expansion system.

Connecting JBOD Expansion Systems

Qsan storage systems support expansion systems with SAS connections. When connecting to an expansion system, it will be displayed at the drop-down list in **Volume configuration -> Physical**

disk tab. For example: Local, JBOD 1 (QSAN J300Q), JBOD 2 (QSAN J300Q), ...etc. Local means disks in local controller, and so on. The hard drives in JBOD can be used as local disks.

Show PD for: JBOD 1 (QSAN J300H) 5001378004B70140 - Show size unit as: (GB)

<< first < prev JBOD 1 (QSAN J300H) 5001378004B70140 - JBOD 2 (QSAN J300H) 5001378004B70100 - JBOD 3 (QSAN J300H) 5001378004B70100

	Slot	Size(GB)	RG	Status	Health	Usage	Vendor	Serial	Type	Write cache	Standby	Readahead	Command queuing
OP	1	465	R0	Online	Good	RAID disk	SEAGATE	9QMBKV6R00009942TKPJ	SAS	Enabled	Disabled	Enabled	Enabled
OP	2	465	R0	Online	Good	RAID disk	SEAGATE	9QMBKDZF000099445E9B	SAS	Enabled	Disabled	Enabled	Enabled
OP	3	931	R0	Online	Good	RAID disk	WDC	WD-WMATV0352487	SAS	Enabled	Disabled	Enabled	Enabled
OP	4	931	R0	Online	Good	RAID disk	WDC	WD-WMATV035237	SAS	Enabled	Disabled	Enabled	Enabled
OP	5	465	R1	Online	Good	RAID disk	SEAGATE	9QMBKE1R000099445E4T	SAS	Enabled	Disabled	Enabled	Enabled
OP	6	68	R1	Online	Good	RAID disk	SEAGATE	3LQ4B2FG	SAS	Enabled	Disabled	Enabled	Enabled
OP	7	931	R1	Online	Good	RAID disk	WDC	WD-WMATV0340962	SAS	Enabled	Disabled	Enabled	Enabled
OP	8	465	R1	Online	Good	RAID disk	Seagate	9VM5WDFM	SAS	Enabled	Disabled	Enabled	Enabled
OP	9	465	R5	Online	Good	RAID disk	SEAGATE	9QMBKE2W000099445C09	SAS	Enabled	Disabled	Enabled	Enabled
OP	10	465	R5	Online	Good	RAID disk	SEAGATE	9QM4ABA900009945WG0K	SAS	Enabled	Disabled	Enabled	Enabled
OP	11	931	R5	Online	Good	RAID disk	WDC	WD-WMATV0350385	SAS	Enabled	Disabled	Enabled	Enabled
OP	12	931	R5	Online	Good	RAID disk	WDC	WD-WMATV0353950	SAS	Enabled	Disabled	Enabled	Enabled
OP	13	465	R6	Online	Good	RAID disk	SEAGATE	9QMBKDVN000099445BS0	SAS	Enabled	Disabled	Enabled	Enabled
OP	14	465	R6	Online	Good	RAID disk	SEAGATE	9QMBHBL9000099445BRN	SAS	Enabled	Disabled	Enabled	Enabled
OP	15	931	R6	Online	Good	RAID disk	WDC	WD-WMATV0448211	SAS	Enabled	Disabled	Enabled	Enabled
OP	16	465	R6	Online	Good	RAID disk	Seagate	9VM5VZSK	SAS	Enabled	Disabled	Enabled	Enabled

Enclosure management -> Hardware monitor can display the hardware status of SAS JBODs.

Page 1

Show information for: JBOD 1 (QSAN J300H) 5001378004B70140 -

Controller 1

<< first < prev 1 2 next > last >>

Type	Item	Value	Status
Voltage	PSU +3.3V(H60)	3.44 V	OK
Voltage	PSU +5V(H60)	5.12 V	OK
Voltage	PSU +12V(H60)	12.19 V	OK
Voltage	+1.0V (Onboard)	1.02 V	OK
Voltage	+1.8V (Onboard)	1.86 V	OK
Voltage	+3.3V (Onboard)	3.41 V	OK
Voltage	+5V (Onboard)	5.17 V	OK
Voltage	+12V (Onboard)	12.31 V	OK
Temperature	Loaction 1(H60)	32.0 (C)	OK
Temperature	Loaction 2(H60)	33.0 (C)	OK
Temperature	Loaction 3(H60)	32.0 (C)	OK
Temperature	Loaction 4(H60)	33.0 (C)	OK
Temperature	Loaction 5(H60)	31.0 (C)	OK
Temperature	Loaction 6(H60)	31.0 (C)	OK
Temperature	Loaction 7(H60)	29.0 (C)	OK
Temperature	Loaction 8(H60)	30.0 (C)	OK
Temperature	Onboard 1	69.0 (C)	OK
Temperature	Onboard 2	40.0 (C)	OK
Temperature	Onboard 3	35.0 (C)	OK
Power Supply	PSU 1	N/A	OK

<< first < prev 1 2 next > last >>

Controller 2

<< first < prev 1 2 next > last >>

Type	Item	Value	Status
Voltage	PSU +3.3V(H60)	3.44 V	OK
Voltage	PSU +5V(H60)	5.12 V	OK
Voltage	PSU +12V(H60)	12.19 V	OK
Voltage	+1.0V (Onboard)	1.01 V	OK
Voltage	+1.8V (Onboard)	1.84 V	OK
Voltage	+3.3V (Onboard)	3.38 V	OK
Voltage	+5V (Onboard)	5.10 V	OK
Voltage	+12V (Onboard)	12.27 V	OK
Temperature	Loaction 1(H60)	32.0 (C)	OK
Temperature	Loaction 2(H60)	33.0 (C)	OK
Temperature	Loaction 3(H60)	32.0 (C)	OK
Temperature	Loaction 4(H60)	33.0 (C)	OK
Temperature	Loaction 5(H60)	31.0 (C)	OK
Temperature	Loaction 6(H60)	31.0 (C)	OK
Temperature	Loaction 7(H60)	29.0 (C)	OK
Temperature	Loaction 8(H60)	30.0 (C)	OK
Temperature	Onboard 1	71.0 (C)	OK
Temperature	Onboard 2	46.0 (C)	OK
Temperature	Onboard 3	42.0 (C)	OK
Power Supply	PSU 1	N/A	OK

<< first < prev 1 2 next > last >>

Page 2

Hardware monitor			
UPS SES S.M.A.R.T.			
Show information for: JBOD 1 (QSAN J300H) 5001378004B70140 -			
Controller 1			
<< first < prev 1 2 next > last >>			
Type	Item	Value	Status
Power Supply	PSU 2	N/A	OK
Cooling	FAN 1	3180 RPM	OK
Cooling	FAN 2	3510 RPM	OK
Cooling	FAN 3	3470 RPM	OK
Cooling	FAN 4	3180 RPM	OK
<< first < prev 1 2 next > last >>			
Controller 2			
<< first < prev 1 2 next > last >>			
Type	Item	Value	Status
Power Supply	PSU 2	N/A	OK
Cooling	FAN 1	3180 RPM	OK
Cooling	FAN 2	3510 RPM	OK
Cooling	FAN 3	3470 RPM	OK
Cooling	FAN 4	3180 RPM	OK
<< first < prev 1 2 next > last >>			

Enclosure management -> S.M.A.R.T. can display S.M.A.R.T. information of all PDs, including Local and all SAS JBODs.

Self-Monitoring Analysis and Reporting Technology(S.M.A.R.T).								
A diagnostic tool for hard drives to deliver warning of drive failures in advance. S.M.A.R.T. provides users chances to take actions before possible drive failure.								
Show information for: JBOD 1 (QSAN J300H) 5001378004B70140 -								
<< first < prev 1 next >								
Slot	HDD type	Read error	Spin up	Reallocated sector	Seek error	Spin up	Calibration	Temperature
1	SAS	N/A	N/A	N/A	N/A	N/A	N/A	30
2	SAS	N/A	N/A	N/A	N/A	N/A	N/A	31
3	SAS	N/A	N/A	N/A	N/A	N/A	N/A	36
4	SAS	N/A	N/A	N/A	N/A	N/A	N/A	35
5	SAS	N/A	N/A	N/A	N/A	N/A	N/A	32
6	SAS	N/A	N/A	N/A	N/A	N/A	N/A	34
7	SAS	N/A	N/A	N/A	N/A	N/A	N/A	35
8	SAS	N/A	N/A	N/A	N/A	N/A	N/A	34
9	SAS	N/A	N/A	N/A	N/A	N/A	N/A	31
10	SAS	N/A	N/A	N/A	N/A	N/A	N/A	31
11	SAS	N/A	N/A	N/A	N/A	N/A	N/A	36
12	SAS	N/A	N/A	N/A	N/A	N/A	N/A	35
13	SAS	N/A	N/A	N/A	N/A	N/A	N/A	31
14	SAS	N/A	N/A	N/A	N/A	N/A	N/A	30
15	SAS	N/A	N/A	N/A	N/A	N/A	N/A	34
16	SAS	N/A	N/A	N/A	N/A	N/A	N/A	34

SAS JBOD expansion has some constraints as described in the followings:

1. User could create RAID group among multiple chassis, max number of disks in a single RAID group is 32.
2. Global spare disk can support all RAID groups which located in the different chassis.

3. When support SATA drives for the redundant JBOD model, the 6G MUX board is required. The 3G MUX board does not apply to this model.
4. The following table is the maximum JBOD numbers and maximum HDD numbers with different chassis can be cascaded.

AegisSAN Q500:

Q500-F20 / Q500-F21 / Q500-F30 / Q500-P10 / Q500-P20 series:

RAID Storage System	RAID Storage System		
	D212	D316	D424
J300Q-D212 no.	20	20	19
Max HDD no.	252	256	252
J300Q-D316 no.	15	15	14
Max HDD no.	252	256	248
J300Q-D424 no.	10	10	9
Max HDD no.	252	256	240

AegisSAN:

F300Q / F400Q / P300Q / P500Q / S300Q series:

RAID Storage System	Dual controller + Dual JBOD			Single upgradable + Single JBOD		
	D212	D316	D424 D224	S212	S316	S424 S224
J300Q-D212 no.	4	4	4			
Max HDD no.	60	64	72			
J300Q-D224 no.	2	2	2			
Max HDD no.	60	64	72			
J300Q-D316 no.	3	3	3			
Max HDD no.	60	64	72			
J300Q-D424 no.	2	2	2			
Max HDD no.	60	64	72			
J300Q-C212 no.				8	8	8
Max HDD no.				108	112	120
J300Q-C224 no.				4	4	4
Max HDD no.				108	112	120
J300Q-C316 no.				6	6	6
Max HDD no.				108	112	120
J300Q-C424 no.				4	4	4
Max HDD no.				108	112	120

AegisSAN LX:

F600Q / P400Q / P600Q series:

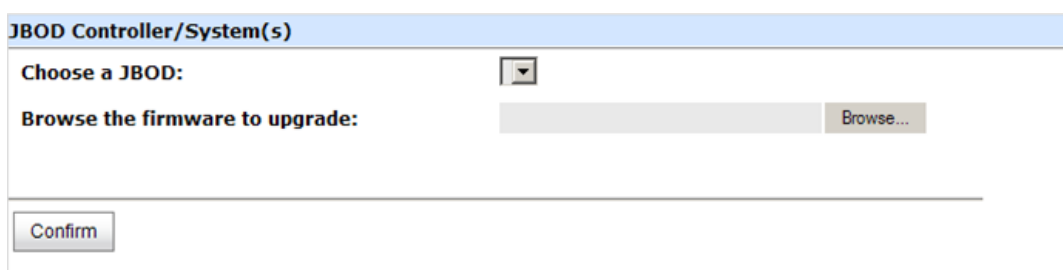
RAID Storage System	RAID Storage System			
	D212	D316	D424	D460
J300Q-D212 no.	20	20	19	
Max HDD no.	252	256	252	
J300Q-D316 no.	15	15	14	

Max HDD no.	252	256	248
J300Q-D424 no.	10	10	9
Max HDD no.	252	256	240
J300Q-D460 no.	3		
Max HDD no.	240		

Upgrade Firmware of JBOD

Before upgrade, it's recommend to use **System maintenance -> Import and Export** function to backup all configurations to a file. To upgrade the firmware of JBOD, please follow the procedures.

1. Please login system as the admin role first, and then go **System maintenance -> Upgrade**.



The screenshot shows a web interface titled "JBOD Controller/System(s)". It contains a section "Choose a JBOD:" with a dropdown menu. Below it is a section "Browse the firmware to upgrade:" with a text input field and a "Browse..." button. At the bottom left of the form is a "Confirm" button.

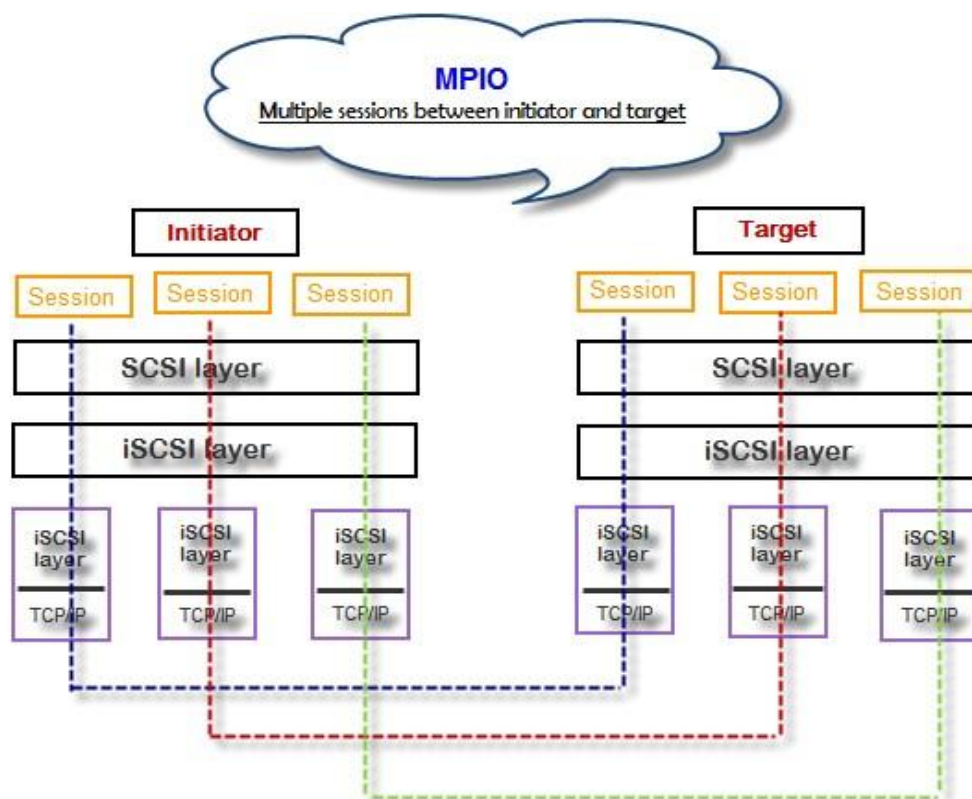
2. Choose a JBOD which you prepare to upgrade.
3. Please prepare new firmware file in local hard drive, then click **Browse** button to select the file. Click **Confirm** button.
4. After finished upgrading, the JBOD system must reboot manually to make the new firmware took effect.

MPIO and MC/S

These features come from iSCSI initiator. They can be setup from iSCSI initiator to establish redundant paths for sending I/O from the initiator to the target.

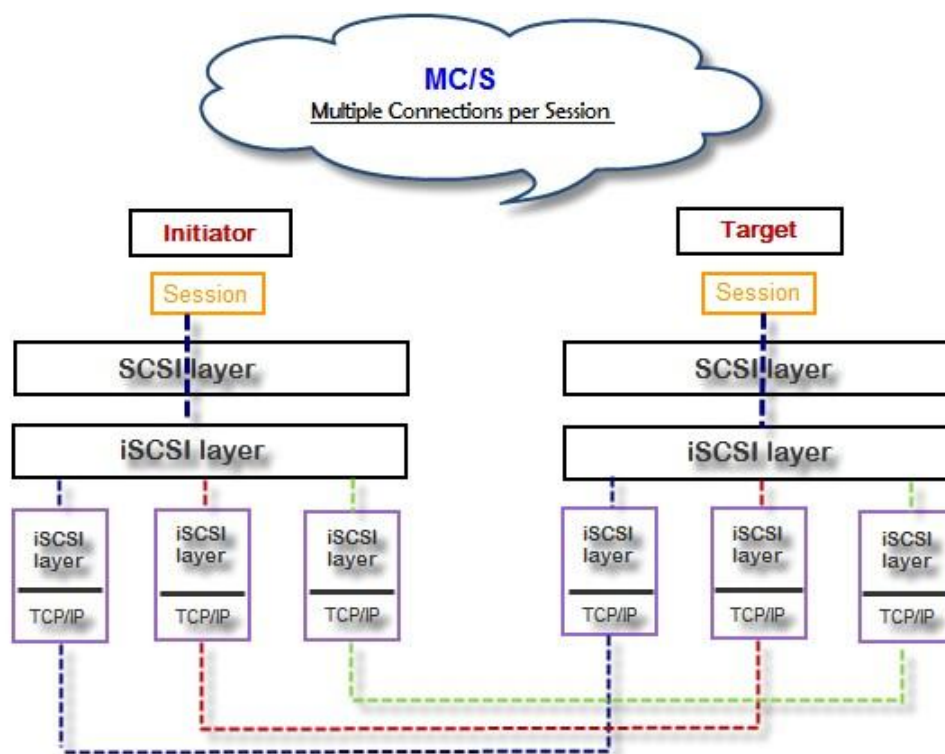
MPIO

In Microsoft Windows server base system, Microsoft MPIO driver allows initiators to login multiple sessions to the same target and aggregate the duplicate devices into a single device. Each session to the target can be established using different NICs, network infrastructure and target ports. If one session fails, then another session can continue processing I/O without interruption to the application.



MC/S

MC/S (Multiple Connections per Session) is a feature of iSCSI protocol, which allows combining several connections inside a single session for performance and failover purposes. In this way, I/O can be sent on any TCP/IP connection to the target. If one connection fails, another connection can continue processing I/O without interruption to the application.



Difference

MC/S is implemented on iSCSI level, while MPIO is implemented on the higher level. Hence, all MPIO infrastructures are shared among all SCSI transports, including Fiber Channel, SAS, etc. MPIO is the most common usage across all OS vendors. The primary difference between these two is which level the redundancy is maintained. MPIO creates multiple iSCSI sessions with the target storage. Load balance and failover occurs between the multiple sessions. MC/S creates multiple connections within a single iSCSI session to manage load balance and failover. Notice that iSCSI connections and sessions are different than TCP/IP connections and sessions. The above figures describe the difference between MPIO and MC/S.

There are some considerations when user chooses MC/S or MPIO for multipathing.

1. If user uses hardware iSCSI off-load HBA, then MPIO is the only one choice.
2. If user needs to specify different load balance policies for different LUNs, then MPIO should be used.
3. If user installs anyone of Windows XP, Windows Vista or Windows 7, MC/S is the only option since Microsoft MPIO is supported Windows Server editions only.
4. MC/S can provide higher throughput than MPIO in Windows system, but it consumes more CPU resources than MPIO.

Trunking and LACP

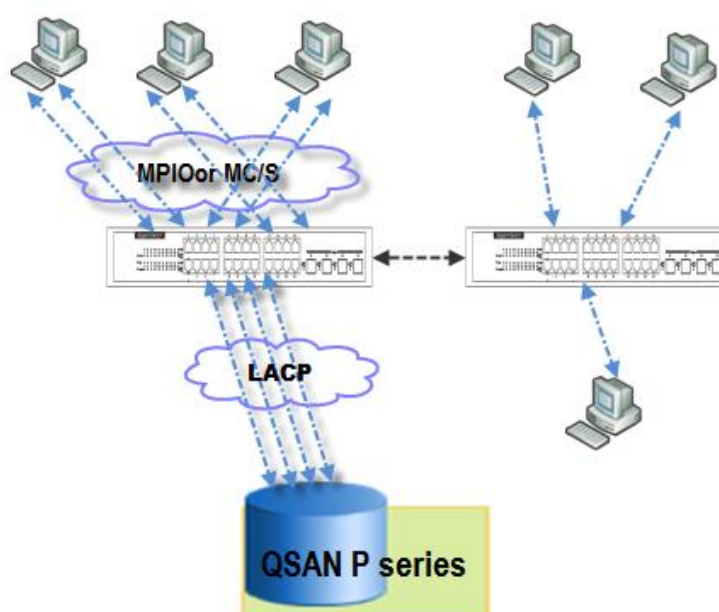
Link aggregation is the technique of taking several distinct Ethernet links to let them appear as a single link. It has a larger bandwidth and provides the fault tolerance ability. Beside the advantage of wide bandwidth, the I/O traffic remains operating until all physical links fail. If any link is restored, it will be added to the link group automatically.

LACP

The Link Aggregation Control Protocol (LACP) is a part of IEEE specification 802.3ad. It allows bundling several physical ports together to form a single logical channel. A network switch negotiates an automatic bundle by sending LACP packets to the peer. Theoretically, LACP port can be defined as active or passive. Qsan controller implements it as active mode which means that LACP port sends LACP protocol packets automatically. Please notice that using the same configurations between Qsan controller and gigabit switch.

The usage occasion of LACP:

- It's necessary to use LACP in a network environment of multiple switches. When adding new devices, LACP will separate the traffic to each path dynamically.

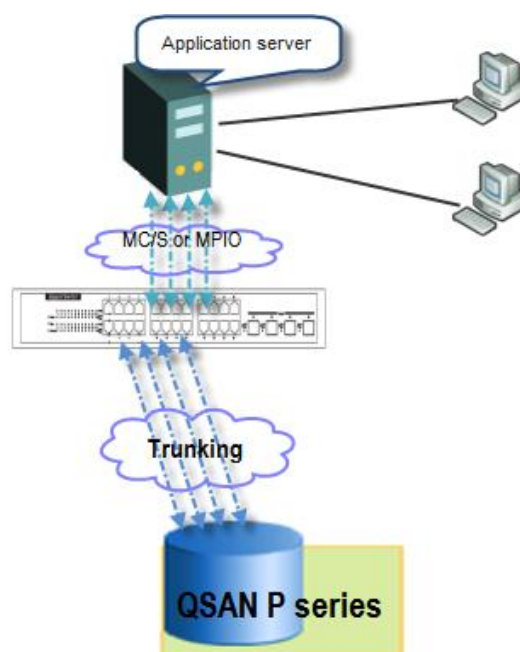


Trunking

Trunking is not a standard protocol. It defines the usage of multiple iSCSI data ports in parallel to increase the link speed beyond the limits of any single port.

The usage occasion of Trunking:

- This is a simple SAN environment. There is only one switch to connect the server and storage. And there is no extra server to be added in the future.
- There is no idea of using LACP or Trunking, uses Trunking first.
- There is a request of monitoring the traffic on a trunk in switch.

**CAUTION:**

Before using trunking or LACP, the gigabit switch must support either trunking or LACP. Otherwise, host cannot connect the link with storage device.

Dual Controllers

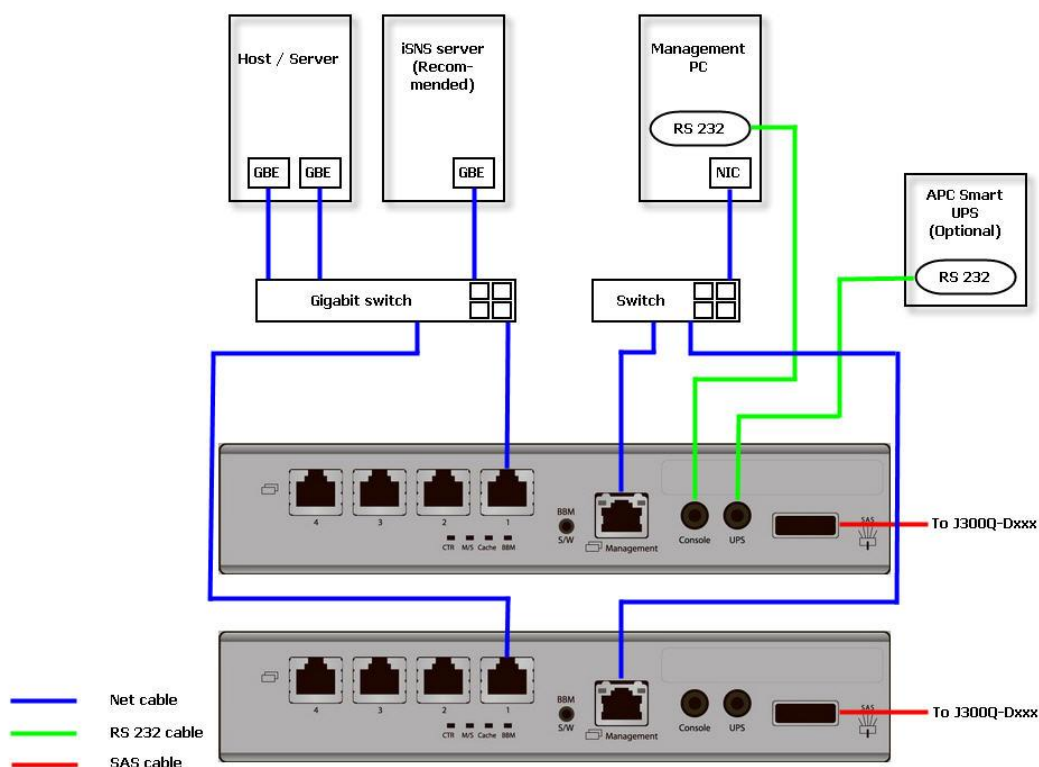
The Qsan storage system supports dual controllers of the same type for redundancy. Controller 1 (CTRL 1) is the master controller and controller 2 (CTRL 2) is the slave.

**CAUTION:**

- If you try to increase the system memory and running in dual controller mode, please make sure both controllers have the same DIMM on each corresponding memory slot. Failing to do so will result in controller malfunction, which will not be covered by warranty.
- Be aware that when Controller Health LED is in RED, please DO NOT unplug the controller from the system or turn off the power suddenly. This may cause unrecoverable damage, which will not be covered by warranty.

Perform I/O

Please refer to the following topology and have all the connections ready. To perform I/O on dual controllers, server/host should setup MPIO. MPIO policy will keep I/O running and prevent fail connection with single controller failure. The following example shows the P300Q-Dxxx series.

**Ownership**

When creating RG, it will be assigned with a preferred owner, the default owner is controller 1. To change the RG ownership, please follow the procedures.

1. Select **Volume configuration -> RAID group**.
2. Select the RG, and then click **OP. -> Set preferred owner**.

Show size unit as: (GB)

	Name	Total(GB)	Free(GB)	#PD	#VD	Status	Health	RAID	Current owner	Preferred owner	Enclosure
OP.	RG-R0	1862	1862	4	0	Online	Good	RAID 0	Controller 1	Controller 1	Local

Migrate
Activate
Deactivate
Scrub
Delete
Set preferred owner
Set disk property
More information

- The ownership of the RG will be switched to the other controller.

Show size unit as: (GB)

	Name	Total(GB)	Free(GB)	#PD	#VD	Status	Health	RAID	Current owner	Preferred owner	Enclosure
OP.	RG-R0	1862	1862	4	0	Online	Good	RAID 0	Controller 2	Controller 2	Local

Create

Controller Status

There are four statuses described on the following. It can be found in **System maintenance -> System information**.

- Normal:** Dual controller mode. Both of controllers are functional.
- Degraded:** Dual controller mode. When one controller fails or has been plugged out, the system will turn to degraded. In this stage, I/O will force to write through for protecting data and the ownership of RG will switch to good one. For example: if controller 1 which owns the RG1 fails accidentally, the ownership of RG1 will be switched to controller 2 automatically. And the system and data can keep working well. After controller 1 is fixed or replaced, The current owner of all RGs will be assigned back to their preferred owner.
- Lockdown:** Dual controller mode. The firmware of two controllers is different or the size of memory of two controllers is different. In this stage, only master controller can work and I/O will force to write through for protecting data.
- Single:** Single controller mode. In the stage, the controller must stay in slot A. 3G/6G MUX boards for SATA drives are not necessary. The differences between single and degraded are described on the following. There is no error message for inserted one controller only. I/O will not force to write through. And there is no ownership of RG. Single controller mode can be upgraded to dual controller mode, please contact the distributor for upgradable.

In addition, iSNS server is recommended. It's important for keeping I/O running smoothly when RG ownership is switching or single controller is failed. Without iSNS server, when controller 1 fails, the running I/O from host to controller 1 may fail because the time which host switches to the new portal is slower than I/O time out. With iSNS server, this case would not happen.

**TIP:**

iSNS server is recommended for dual controller system of iSCSI interfaces.

QReplica

QReplica function will help users to replicate data easily through LAN or WAN from one system to another. The procedures of QReplica are on the following:

1. Copy all data from source VD to target VD at the beginning (full copy).
2. Use QSnap technology to perform the incremental copy afterwards. Please be fully aware that the incremental copy needs to use snapshot to compare the data difference. Therefore, the enough snapshot space for VD clone is very important.

To use QReplica function, please check whether it is activated or not. It is displayed on **Maintenance -> System information**. If the function has been activated, please skip the following step **Activate the license key** and start to use it.

Configure the QReplica

Activate the license key

User needs to obtain a license key and download it to the RAID subsystem to activate the QReplica function. Each license key is unique and dedicated to a specific system. It means that the license key for system A can not be used on another system. To obtain the license key, please contact sales for assistance.

Setup the QReplica port on the source system

The QReplica uses the last iSCSI port on the controller to replicate the data. When the iSCSI is configured as QReplica port, it is no longer available for the host to connected as iSCSI port until it is configured as the normal iSCSI port again.

1. In the operation menu of the last iSCSI port on the controller, click **OP. -> Enable QReplica** to set this port as the QReplica port. The last iSCSI port on controller 2 will also be set as the QReplica port automatically at the same time.

Show information for: **Controller 1**

	Name	LAG	LAG No	DHCP	IP address	Netmask
OP.	LAN1	No	N/A	No	192.168.1.1	255.255.255.0
OP.	LAN2	No	N/A	No	192.168.2.1	255.255.255.0
OP.	LAN3	No	N/A	No	192.168.3.1	255.255.255.0
OP.	LAN4	No	N/A	No	192.168.4.1	255.255.255.0

Link aggregation or Multi-homed
 IP settings for iSCSI ports
 Become default gateway
 Enable jumbo frame
 Ping host
Enable QReplica

- The setting can be reverted by clicking **OP.** -> **Disable QReplica**.

Show information for: **Controller 1**

	Name	LAG	LAG No	DHCP	IP address	Netmask
OP.	LAN1	No	N/A	No	192.168.1.1	255.255.255.0
OP.	LAN2	No	N/A	No	192.168.2.1	255.255.255.0
OP.	LAN3	No	N/A	No	192.168.3.1	255.255.255.0
OP.	QREP	N/A	N/A	No	192.168.4.1	255.255.255.0

QReplica IP setting
Disable QReplica

Create backup Virtual Disk on the target system

- Before creating the replication job on the source subsystem, user has to create a virtual disk on the target system and change the type as "BACKUP".

Create

Create

Name : target

RG name : target

Capacity : 300 GB

Stripe height (KB) : 64

Block size (B) : 512

Read/Write : ☐ Write-through cache ☒ Write-back cache

Priority : ☒ High priority ☐ Middle priority ☐ Low priority

Bg rate : 4

Readahead : Enabled

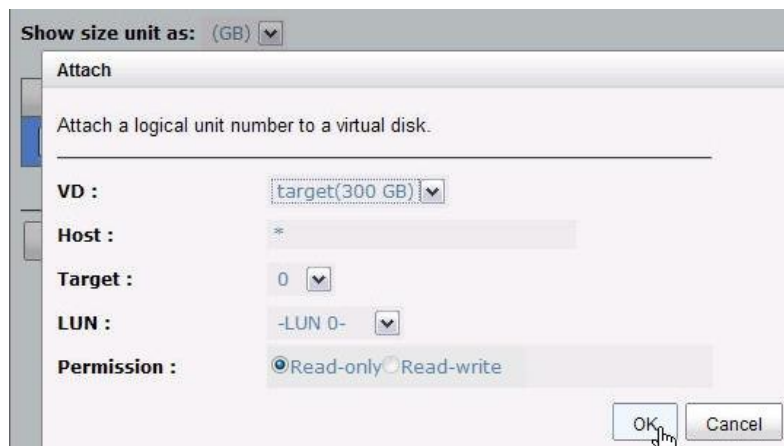
AV-media mode : Disabled

Erase : None

Type : **BACKUP**

OK Cancel

- The backup virtual disk needs to be attached to a LUN ID before creating replication job. And the virtual disk of <BACKUP> type can only be attached with <Read-only> permission to prevent it from being modified incautiously.



Attach

Attach a logical unit number to a virtual disk.

VD : target(300 GB)

Host : *

Target : 0

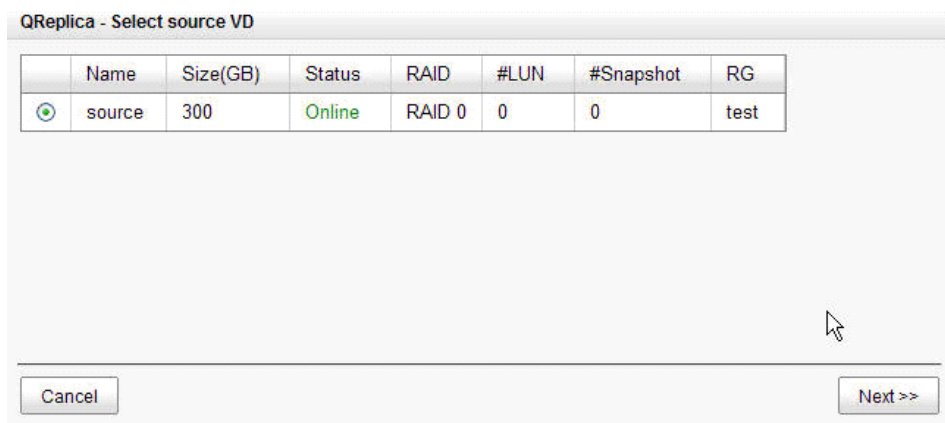
LUN : -LUN 0-

Permission : ☒ Read-only ☐ Read-write

OK Cancel

Create replication job on the source system

- If the license key is activated on the subsystem correctly, a new QReplica tab will be added on the Web UI. Click **Create** button to create a new replication job.
- Select the source virtual disk which will be replicated to the target subsystem and click **Next** button.



QReplica - Select source VD

	Name	Size(GB)	Status	RAID	#LUN	#Snapshot	RG
<input checked="" type="radio"/>	source	300	Online	RAID 0	0	0	test

Cancel Next >>



TIP:

If the message displays that there is not enough space for creation, please refer to the section of "Configure the snapshot space" below for details.

- Enter the IP address of iSCSI port on controller 1 of the target subsystem. Click **Next** button to continue.

QReplica - Select target IP

IP : 192.168.1.11

Cancel << Back Next >>

- The QReplica uses standard iSCSI protocol for data replication. User has to log on the iSCSI node to create the iSCSI connection for the data transmission. Enter the **CHAP** information if necessary and select the target node to log no. Click **Next** button to continue.

QReplica - Get login information

Choose authentication method.

☒ No Authentication method

☐ CHAP

User : (max: 223)

Secret : (min: 12, max: 16)

Select a target node

No.	Name
<input checked="" type="radio"/> 1	iqn.2004-08.com.qsantechonology:p300q-d424-000901fd8:dev0.ctr1

Cancel << Back Next >>

- Choose the backup virtual disk and click **Next** button.

QReplica - Select target LUN

No.	LUN	Size(GB)	Vendor	Model	Serial	Revision
<input checked="" type="radio"/> 1	0	300	Qsan	P300H	203C001378901FD8	103

Cancel << Back Next >>

- A new replication job is created and listed on the **QReplica** page.

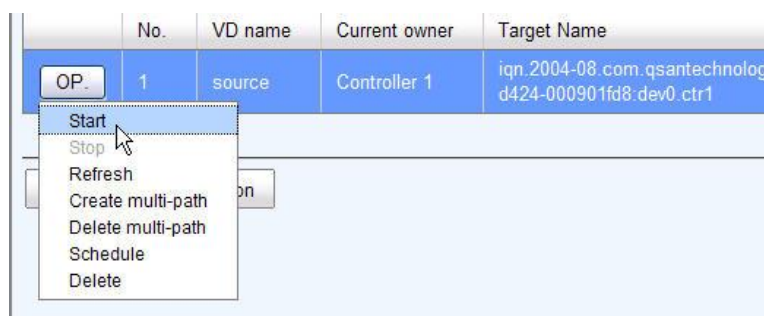
	No.	VD name	Current owner	Target Name	Target IP	LUN	Size(MB)	Size(GB)	Status
OP.	1	source	Controller 1	iqn.2004-08.com.qsantechology:p300q-d424-000901fd8.dev0.ctr1	192.168.1.5	0	307200	300	Online

Create Rebuild Configuration

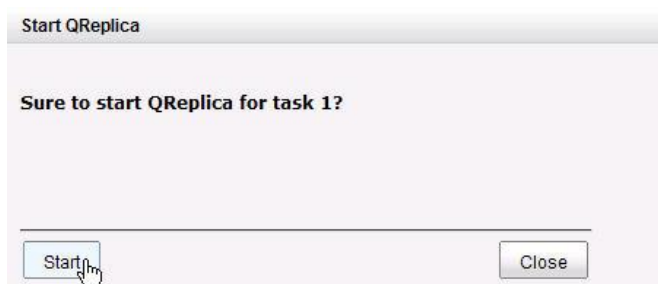
Operate the Replication Jobs

Execute the replication job

- Click **OP.** -> **Start** button to execute the replication job.



- Click **Start** button again to confirm the execution of the replication job.



- User can monitor the replication job from the Status information and the progress is expressed by percentage.

	No.	VD name	Current owner	Target Name	Target IP	LUN	Size(MB)	Size(GB)	Status	%
OP.	1	source	Controller 1	iqn.2004-08.com.qsantechology:p300q-d424-000901fd8.dev0.ctr1	192.168.1.11	0	307200	300	Replicating	1

Create Configuration

Create multi-path on the replication job

1. Select the replication job, and then click **OP.** -> **Create multi-path**.



2. Enter the IP of iSCSI port on controller 2 of the target subsystem.

QReplica - Select target IP

IP : 192.168.1.15

Cancel << Back Next >>

3. Select the iSCSI node to log on and click **Next** button.

QReplica - Get login information

Choose authentication method.

☒ **No Authentication method**

☐ CHAP

User : (max: 223)

Secret : (min: 12, max: 16)

Select a target node

	No.	Name
<input checked="" type="radio"/>	1	iqn.2004-08.com.qsantechology:p300q-d424-000901fd8:dev0.ctr2

Cancel << Back Next >>

4. Choose the same target virtual disk and click **Next** button.

QReplica - Select target LUN

	No.	LUN	Size(GB)	Vendor	Model	Serial	Revision
<input checked="" type="radio"/>	1	0	300	Qsan	P300H	203C001378901FD8	103

- A new target will be added in this replication job as a redundancy path.

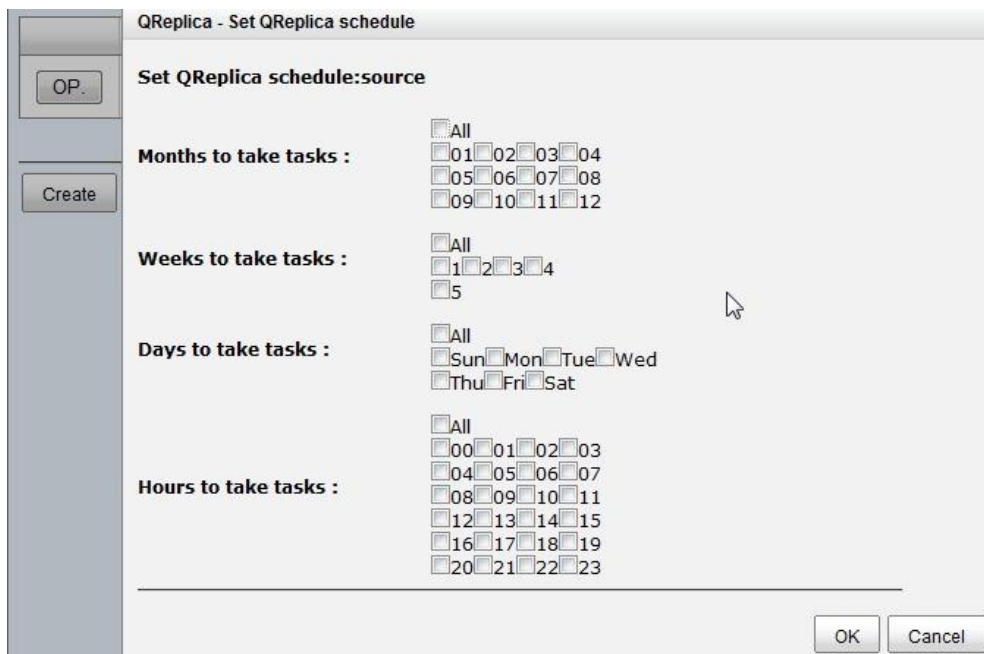
	No.	VD name	Current owner	Target Name	Target IP	LUN
<input type="button" value="OP."/>	1	source	Controller 1	iqn.2004-08.com.qsantechonology:p300q-d424-000901fd8:dev0.ctr1	192.168.1.5	0
				iqn.2004-08.com.qsantechonology:p300q-d424-000901fd8:dev1.ctr1	192.168.1.8	0

Configure the replication job by schedule

- Select the replication job, and then click **OP.** -> **Schedule**.

	No.	VD name	Current owner	Target Name
<input type="button" value="OP."/>	1	source	Controller 1	iqn.2004-08.com.qsantechonology:p300q-d424-000901fd8:dev0.ctr1

- The replication job can be scheduled to run by hour, by day, by week or by month. The execution time can be configurable per user's need. If the scheduled time of execution is arrived but the pervious replication job is stiling going, the scheduled execution will be ignored once.



QReplca - Set QReplca schedule

OP.

Create

Set QReplca schedule:source

Months to take tasks : ☐ All
☐ 01 ☐ 02 ☐ 03 ☐ 04
☐ 05 ☐ 06 ☐ 07 ☐ 08
☐ 09 ☐ 10 ☐ 11 ☐ 12

Weeks to take tasks : ☐ All
☐ 1 ☐ 2 ☐ 3 ☐ 4
☐ 5

Days to take tasks : ☐ All
☐ Sun ☐ Mon ☐ Tue ☐ Wed
☐ Thu ☐ Fri ☐ Sat

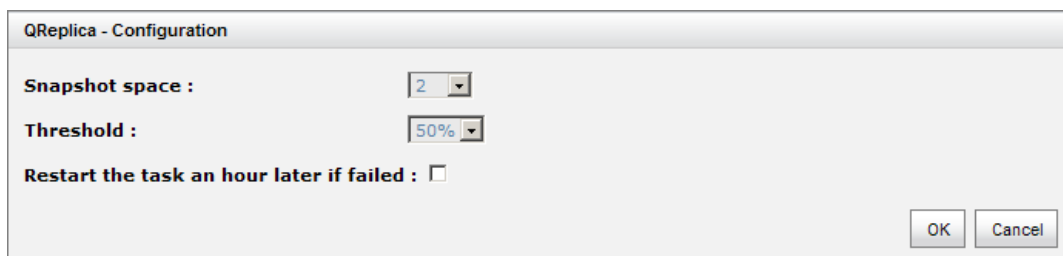
Hours to take tasks : ☐ All
☐ 00 ☐ 01 ☐ 02 ☐ 03
☐ 04 ☐ 05 ☐ 06 ☐ 07
☐ 08 ☐ 09 ☐ 10 ☐ 11
☐ 12 ☐ 13 ☐ 14 ☐ 15
☐ 16 ☐ 17 ☐ 18 ☐ 19
☐ 20 ☐ 21 ☐ 22 ☐ 23

OK Cancel

Configure the Snapshot Space

The QReplca uses QSnap, the snapshot technique of Qsan, to help user to replicate the data without stop accessing to the source virtual disk. If the snapshot space is not configured on the source virtual disk in advance, the subsystem will allocate snapshot space for the source virtual disk automatically when the replication job is created. The default snapshot space allocated by the subsystem is two times the size of source virtual disk. If the free space of the RAID group which the source virtual disk resides in is less than double size of the source virtual disk, the replication job will fail and pops up the error message.

To prevent this problem, user has to make sure the RAID group has enough free space for the snapshot space of source virtual disk, or user has to configure the snapshot space of the source virtual disk manually before the replication job is created. To configure the snapshot space settings of QReplca, click the **Configuration** button. There are three settings in the QReplca configuration menu.



QReplca - Configuration

Snapshot space :

Threshold :

Restart the task an hour later if failed : ☐

OK Cancel

- **Snapshot space**

It specifies the ratio of snapshot space allocated to the source virtual disk automatically when the snapshot space is not configured in advance. The default ratio is 2 to 1. It means when the replication job is creating, the subsystem will automatically use the free space of RAID group to create a snapshot space which size is double of the source virtual disk.

- **Threshold (The setting will be effective after enabling schedule replication job)**

The setting will monitor the utilization of snapshot space. When the used snapshot space achieves the threshold, the subsystem will automatically take a new snapshot and start the replication job. The purpose of threshold is to prevent the incremental copy fail immediately when running out of snapshot space. For example, the default threshold is 50%, and the system will check the snapshot space every hour. When the snapshot space is used over 50%, the subsystem will automatically replicate data from the source virtual disk to the target virtual disk. Next time, when the rest snapshot space has been used over 50%, in other words, the total snapshot space has been used over 75%, the subsystem will start the replication job again.

- **Restart the task an hour later if failed (The setting will be effective after enabling schedule replication job)**

The setting is used when running out of snapshot space, the replication job will stop because there is no more available snapshot space. If this option has been check, the subsystem will automatically clear the snapshots to release snapshot space, and the replication job will restart the task after an hour.

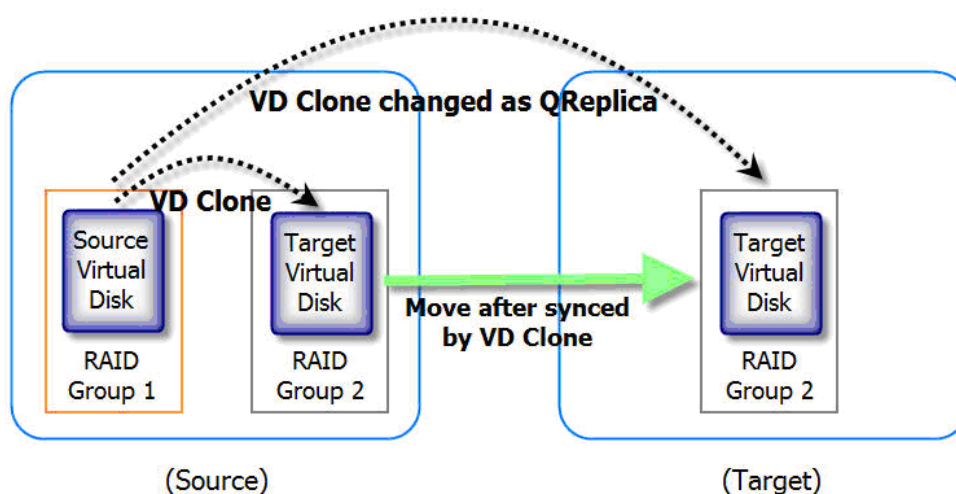
**CAUTION:**

The default snapshot space allocated by the system is two times the size of source virtual disk. That is the best value of our suggestion. If user sets snapshot space by manually and lower than the default value, user should take the risk if the snapshot space is not enough and replication job will fail.

Best Practice for the First Time

It is always being a problem that to do full copy over LAN or WAN when the replication job is executed at the first time. It may take days or weeks to replicate data from source to target subsystem with limited network bandwidth. Qsan provides two features to help user to shorten the time of executing full copy.

1. One is to skip full copy on a new, clean virtual disk. The term “clean” means that the virtual disk has never been written data since created.
2. The other way is to use “VD Clone”, which is a local data copy function between virtual disks to execute full copy at the first time. Then move the physical drives with the target virtual disk to the target subsystem and turn the cloning job into replication with differential copy afterward.



Here are more details about these two methods for setup the replication job at the first time.

Method 1: Skip full copy of replication job for a new, clean virtual disk.

For a new created virtual disk which has not been accessed, the subsystem will recognized it and skip full copy automatically when the replication job is created on this virtual disk at the first time.

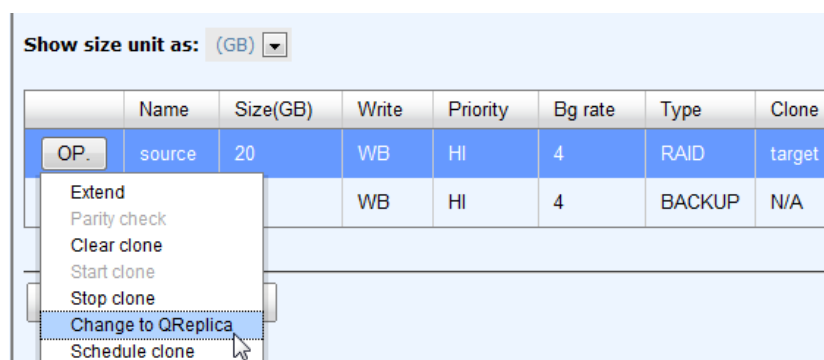
**TIP:**

Any IO access to the new created virtual disk will make it as “not clean” by the subsystem, even though executing “Erase” function when a virtual disk is created. The full copy will take place in such a case.

Method 2: Use “VD Clone” function to finish full copy at the first time.

For a new replication job created on an existing virtual disk with data stored. A full copy is necessary to synchronize the volume image between the source and target virtual disks. It usually takes a long time to synchronize the data especially when the replication job is running over WAN with limited bandwidth. Now QSAN provides an efficient way to let user execute full copy by “VD Clone”, which is a local data copy between source and target virtual disk. Then move the physical drives with the target virtual disk to the target subsystem and turn the cloning job into replication with differential copy afterward. With this solution, user can save a lot of time for full copy at the first time. The followings are the steps:

1. Create a cloning job on an existing virtual disk with data stored already.
2. It is better that there is no host connected to the source virtual disk. Then run **VD Clone** to synchronize the data between source and target virtual disks.
3. After the data is synchronized, change the cloning job to a QReplca job by selecting **Change to QReplca** at the drop down menu of source virtual disk.



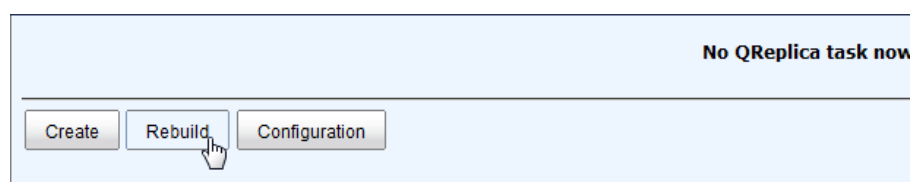
4. The values at the column Clone of source virtual disk will be changed from the name of target virtual disk into <QRep>.

	Name	Size(GB)	Write	Priority	Bg rate	Type	Clone
OP.	source	20	WB	HI	4	RAID	QRep
OP.	target	20	WB	HI	4	BACKUP	N/A

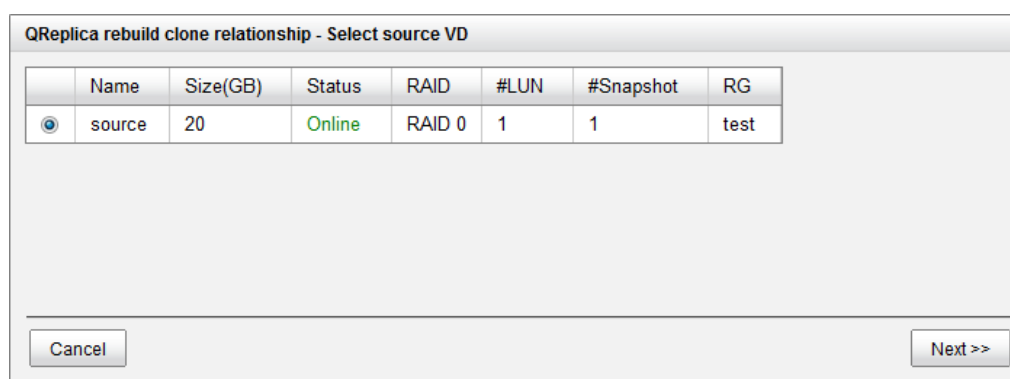
**CAUTION:**

Changing a cloning job to a replication job is only available when the cloning job has been finished. This change is irreversible.

5. Deactivate the RAID group which the target virtual disk resides in and move all physical disks of the RAID group to the target subsystem. Then activate the RAID group in the target subsystem and attach the target virtual disk to a LUN ID.
6. Switch to QReplica tab of the source subsystem and click **Rebuild** button to rebuild the replication job which is changed from a cloning job formerly.



7. Select the replication job to rebuild.



8. Follow the steps as creating a new replication job.
9. If a wrong target virtual disk is selected when rebuilding the replication job, an error message of “The rebuilding source and target VDs are mismatched” will be pop-up and stops user from finishing the creation.

QReplica Constraint

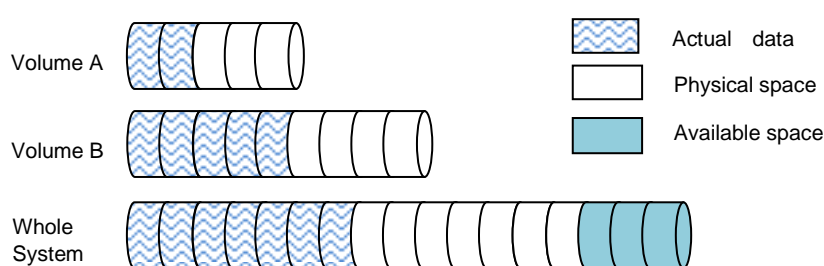
Qsan QReplica function uses QSnap technique on VD and provides a quick and efficient backup methodology. The constraint is inherited from QSnap. In addition, the features are described below.

1. Dedicated port reservation for QReplica usage.
2. Full replication and incremental replication support.

3. Manual and schedule tasks support.
4. Maximum QReplica tasks are 8 in one system.
5. Asynchronous replications for up to 8 logical volumes.
6. QReplica bandwidth is limit in 20MB/s because of the system resource allocation.
7. QReplica has the lowest priority. If there is a volume rebuilding job at the same time, QReplica will stop temporary and then continue after it is completed.

QThin (Only Available in AegisSAN LX)

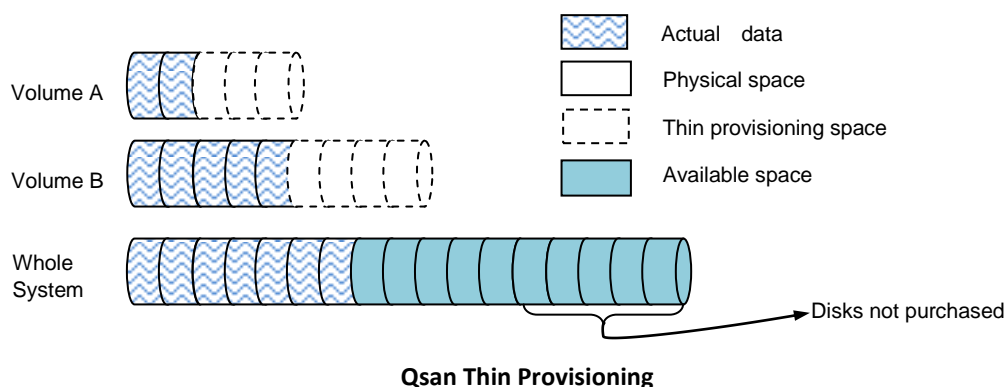
Nowadays thin provisioning is a hot topic people talk about in IT management and storage industry. To make contrast to thin provisioning, it naturally brings to our minds with the opposite term - fat provisioning, which is the traditional way IT administrators allocate storage space to each logical volume that is used by an application or a group of users. When it comes to the point to decide how much space a logical volume requires for three years or for the lifetime of an application, it's really hard to make the prediction correctly and precisely. To avoid the complexity of adding more space to the volumes frequently, IT administrators might as well allocate more storage space to each logical volume than it needs in the beginning. This is why it's called "fat" provisioning. Usually it turns out that a lot of free space is sitting around idle. This stranded capacity is wasted, which equals to waste of investment and inefficiency. Various studies indicate that as much as 75% of the storage capacity in small and medium enterprises or large data centers is allocated but unused. And this is where thin provisioning kicks in.



Traditional Fat Provisioning

Thin provisioning sometimes is known as just-in-time capacity or over allocation. As the term explains itself, it provides storage space by requests dynamically. Thin provisioning presents more storage space to the hosts or servers connecting to the storage system than is actually available on the storage system. Put it in another way. Thin provisioning allocates storage space that may or may not exist. The whole idea is actually another way of virtualization. Virtualization is always about a logical pool of physical assets and provides better utilization over those assets. Here the virtualization mechanism behind thin provisioning is storage pool. The capacity of the storage pool

is shared by all volumes. When write requests come in, the space will be drawn dynamically from this storage pool to meet the needs.



The Benefits of QThin

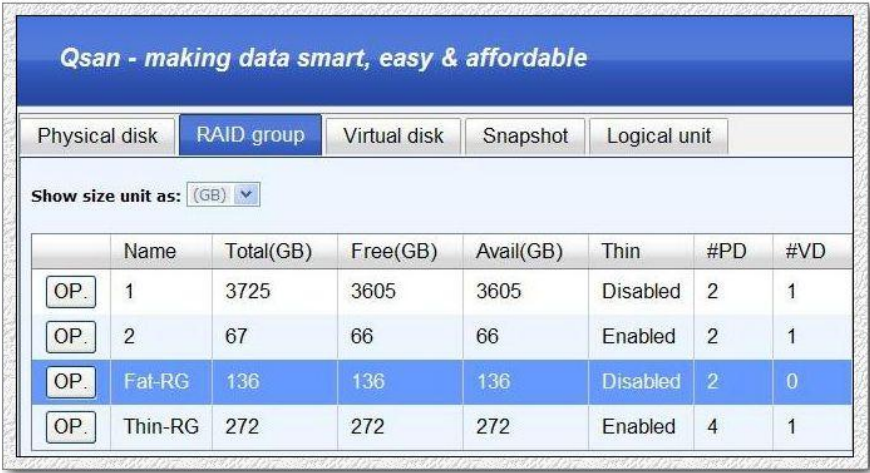
- Less disk purchase is needed initially when setting up a new storage system. You don't need to buy more capacity to meet your future data growth at present time. Usually hard drive price declines as time progresses. You can buy the same hard drives with cheaper price at a later time. Why not save money upfront while you can?
- No stranded storage capacity, better utilization efficiency and lower total cost of ownership. QThin can make full use of the stranded capacity that traditional provisioning can't. All free capacity can be made available to other hosts. A single storage system can serve more hosts and servers to achieve high consolidation ratio. QThin can help you achieve the same level of services with less hard drives purchased upfront, which can significantly reduce your total cost of ownership.
- Scalability: storage pool can grow on demand. When the storage pool (RAID group) has reached the threshold you set before. Up to 32 RAID sets can be added to the RAID group to increase the capacity on demand without interrupting I/O. Each RAID set can have up to 64 physical disks.
- Automatic space reclamation mechanism to recycle unused blocks. The technology used here is called zero reclamation. When a thin RG is created, the initialization process will try to fill out all the storage pool space with zero. This process will run in background with low priority in order not to impact the I/O performance. This is the reason why when there is no I/O traffic from the hosts, the hard drive LED will keep blinking as if there are I/O activities. The purpose of zero reclamation is that when the actual user

data happens to have all zero in a basic allocation unit (granularity), the storage system will treat it as free space and recycle it. Until the next time there is data update to this reclaimed all zero basic unit, the storage system can swiftly return a basic unit from the free storage pool because it's already filled with zero.

- An eco-friendly green feature that helps to reduce energy consumption.
Hard drive is the top power consumer in a storage system. Because you can use less hard drives to achieve the same amount of work, this translates directly to a huge reduction of power consumption and more green in your pocket.

Features Highlight

1. Downward firmware compatibility with existing Qsan array firmware.
You can upgrade your current Qsan Q-series storage system to QThin-enabled firmware with no problem. Certain steps need to be followed to ensure a smooth transition to thin provision enabled environment.
2. Write on demand or allocate on demand.
This is the most distinctive function in thin provisioning. You can see from the screenshots below that figure 1 shows there are two RAID groups created. "Fat-RG" is using traditional provisioning without QThin enabled and its size is 136GB. "Thin-RG" is QThin-enabled and its size is 272GB.



Qsan - making data smart, easy & affordable							
Physical disk RAID group Virtual disk Snapshot Logical unit							
Show size unit as: (GB) ▼							
	Name	Total(GB)	Free(GB)	Avail(GB)	Thin	#PD	#VD
OP.	1	3725	3605	3605	Disabled	2	1
OP.	2	67	66	66	Enabled	2	1
OP.	Fat-RG	136	136	136	Disabled	2	0
OP.	Thin-RG	272	272	272	Enabled	4	1

Figure 1: No virtual disk is created

Let's create a Virtual Disk on each RAID group with the same size of 60GB respectively in figure 2 and see what happen.

Qsan - making data smart, easy & affordable

Physical disk

RAID group

Virtual disk

Snapshot

Logical unit

Show size unit as: (GB)

	Name	Size(GB)	Write	Priority	Bg rate	Type	Clone
OP.	1	100	WB	HI	4	RAID	N/A
OP.	2	60	WB	HI	4	RAID	N/A
OP.	Fat-VD	60	WB	HI	4	RAID	N/A
OP.	Thin-VD	60	WB	HI	4	RAID	N/A

Figure 2: Virtual disks are created.

In figure 3, the free space of "FAT-RG" immediately reduces to 76GB. 60GB is taken away by the virtual disk. However, the free space of "Thin-RG" is still 272GB even though the same size of virtual disk is created from the RAID group. Nothing is written to the virtual disk yet, so no space is allocated. The remaining 272GB can be used to create other virtual disks. This is storage efficiency.

Qsan - making data smart, easy & affordable

Physical disk

RAID group

Virtual disk

Snapshot

Logical unit

Show size unit as: (GB) ▼

	Name	Total(GB)	Free(GB)	Avail(GB)	Thin	#PD	#VD
OP.	1	3725	3605	3605	Disabled	2	1
OP.	2	67	66	66	Enabled	2	1
OP.	Fat-RG	136	76	76	Disabled	2	1
OP.	Thin-RG	272	272	272	Enabled	4	1

Figure 3: Write on demand

- Expand capacity on demand without downtime.

Extra RAID set can be added to the thin RAID group to increase the size of free storage pool. A thin RAID group can have up to 32 RAID sets with each RAID set containing up to 64 physical hard drives. The maximum size of each RAID set is 64TB. Figure 4 shows that "Thin-RG" consists of two RAID sets.

Show size unit as: (GB) ▼

	Name	Total(GB)	Free(GB)	Avail(GB)	Thin	#PD	#VD	Status
OP.	1	3725	3605	3605	Disabled	2	1	Online
OP.	2	67	66	66	Enabled	2	1	Online
OP.	Thin-RG	272	272	272	Enabled	4	0	Online

RAID Set

	No	Total size(GB)	Free size(GB)	#PD	RAID Cell	Status	Health
OP.	1	136	136	2	1	Online	Good
OP.	2	136	136	2	1	Online	Good

Figure 4: Scalable RAID group size

- Allocation unit (granularity) is 1GB. This is a number that demands careful balance between efficiency and performance. The smaller it is, the better the efficiency and the worse the performance becomes, and vice versa.
- Thin provisioned snapshot space and it is writeable.
Snapshot space sits at the same RAID group of the volume that the snapshot is taken against. Therefore when you expose the snapshot into a virtual disk, it becomes a thin-provisioned virtual disk. It will only take up the just the right amount of space to store the data, not the full size of the virtual disk.
- Convert traditional VD to QThin VD and vice versa.
You can enjoy the benefits of QThin right now and right this moment. Upgrade your Qsan Q-series systems to QThin-enabled firmware. Move all your existing fat-provisioned virtual disks to thin-provisioned ones. VD cloning functions can be performed on both directions - fat to thin and thin-to-fat, depending on your application needs. Figure 5 shows cloning a fat virtual disk to a thin one.

Physical disk RAID group Virtual disk Snapshot Logical unit QReplica

Show size unit as: (GB) ▼

	Name	Size(GB)	Write	Priority	Bg rate	Type	Clone	Schedule	Status	Health	R %
OP.	Fat-VD	30	WB	HI	4	RAID	N/A	N/A	Online	Optimal	
OP.	Thin-RG	30	WB	HI	4	BACKUP	N/A	N/A	Online	Optimal	

Select target VD

Select target VD: Thin-RG ▼

OK Cancel

Figure 5: VD cloning between thin VD and fat VD

7. Threshold settings and capacity policies.

These are designed to simplify the management and better monitoring the storage usage. You can set as many as 16 policies for each RAID group. When space usage ratio grows over the threshold set in the policy, the action will be taken and event log will be generated.

Show size unit as: (GB) ▼

	Name	Total(GB)	Free(GB)	Avail(GB)	Thin	#PD	#VD	Status
OP.	1	3725	3605	3605	Disabled	2	1	Online
OP.	2	67	66	66	Enabled	2	1	Online
OP.	Thin-RG	272	272	272	Enabled	4	0	Online

RAID Set :

	No	Total size(GB)	Free size(GB)	#PD	RAID Cell	Status	Health
OP.	1	136	136	2	1	Online	Good
OP.	2	136	136	2	1	Online	Good

RAID Group Policy :

<< first < prev 1 next > last >>

	No	Threshold	Level	Action
OP.	1	60%	INFO	Take no action
OP.	2	70%	INFO	Take no action
OP.	3	80%	INFO	Take no action
OP.	4	85%	WARNING	Take no action
OP.	5	90%	WARNING	Delete snapshots
OP.	6	95%	WARNING	Delete snapshots

Figure 6: Capacity policy settings

8. Automatic space reclamation to recycle unused space and increase utilization rate.

Automatic space reclamation will be automatically activated in RAID group initialization process or it can be set manually through capacity policy. You can set as many as 16 policies. When space usage ratio grows over the threshold set in the policy, space reclamation will be enabled automatically at the background with the lowest priority or when the I/O is low. The resource impact is reduced to minimum.

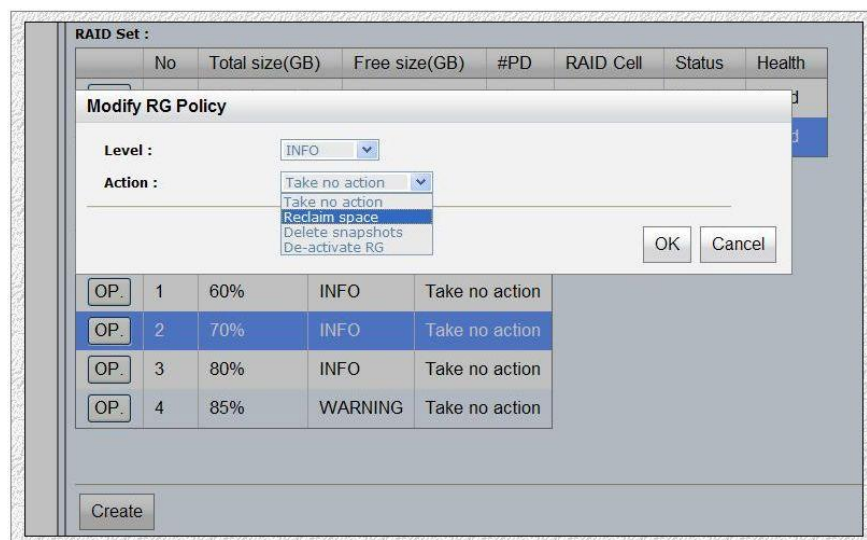


Figure 7: Space reclamation

What scenarios does Thin Provisioning fit well?

We suggest that you apply QThin to non-critical production applications first. Thin provisioning works well when the data written is thin-friendly, which means that the data written is not completely spread across the whole volume. Applications that spread metadata across the entire volume will obviate the advantages of thin provisioning. Some applications that expect the data to be contiguous at block level are not good candidates for thin provisioning as well.

QThin works well with email system, web-based archive, or regular file archive system. When the number of supported volumes grows larger, the benefits of QThin will become more apparent.

6

Troubleshooting

System Buzzer

The system buzzer features are listed below:

- The system buzzer alarms 1 second when system boots up successfully.
- The system buzzer alarms continuously when there is error occurred. The alarm will be stopped after error resolved or be muted.
- The alarm will be muted automatically when the error is resolved. E.g., when RAID 5 is degraded and alarm rings immediately, user changes / adds one physical disk for rebuilding. When the rebuilding is done, the alarm will be muted automatically.

Event Notifications

Physical Disk Events

Level	Type	Description
INFO	PD inserted	Disk <slot> is inserted into system
WARNING	PD removed	Disk <slot> is removed from system
ERROR	HDD read error	Disk <slot> read block error
ERROR	HDD write error	Disk <slot> write block error
ERROR	HDD error	Disk <slot> is disabled
ERROR	HDD IO timeout	Disk <slot> gets no response
INFO	PD upgrade started	PD [<string>] starts upgrading firmware process.
INFO	PD upgrade finished	PD [<string>] finished upgrading firmware process.
WARNING	PD upgrade failed	PD [<string>] upgrade firmware failed.
INFO	PD RPS started L2L	Assign PD <slot> to replace PD <slot>.
INFO	PD RPS finished L2L	PD <slot> is replaced by PD <slot>.
ERROR	PD RPS failed L2L	Failed to replace PD <slot> with PD <slot>.

Hardware Events

Level	Type	Description
WARNING	ECC single	Single-bit ECC error is detected at <address>
ERROR	ECC multiple	Multi-bit ECC error is detected at <address>
INFO	ECC dimm	ECC memory is installed

INFO	ECC none	Non-ECC memory is installed
INFO	SCSI bus reset	Received SCSI Bus Reset event at the SCSI Bus <number>
ERROR	SCSI host error	SCSI Host allocation failed
ERROR	SATA enable device fail	Failed to enable the SATA pci device
ERROR	SATA EDMA mem fail	Failed to allocate memory for SATA EDMA
ERROR	SATA remap mem fail	Failed to remap SATA memory io space
ERROR	SATA PRD mem fail	Failed to init SATA PRD memory manager
ERROR	SATA revision id fail	Failed to get SATA revision id
ERROR	SATA set reg fail	Failed to set SATA register
ERROR	SATA init fail	Core failed to initialize the SATA adapter
ERROR	SATA diag fail	SATA Adapter diagnostics failed
ERROR	Mode ID fail	SATA Mode ID failed
ERROR	SATA chip count error	SATA Chip count error
INFO	SAS port reply error	SAS HBA port <number> reply terminated abnormally
INFO	SAS unknown port reply error	SAS frontend reply terminated abnormally
INFO	FC port reply error	FC HBA port <number> reply terminated abnormally
INFO	FC unknown port reply error	FC frontend reply terminated abnormally
INFO	Port linkup	The Port <number> link status is changed to Up.
INFO	Port linkdown	The Port<number> link status is changed to Down.

EMS Events

Level	Type	Description
INFO	Power install	Power(<string>) is installed
ERROR	Power absent	Power(<string>) is absent
INFO	Power restore	Power(<string>) is restored to work.
ERROR	Power fail	Power(<string>) is not functioning
WARNING	Power detect	PSU signal detection(<string>)
INFO	Fan restore	Fan(<string>) is restored to work.
ERROR	Fan fail	Fan(<string>) is not functioning
INFO	Fan install	Fan(<string>) is installed
ERROR	Fan not present	Fan(<string>) is not present
ERROR	Fan over speed	Fan(<string>) is over speed
WARNING	Thermal level 1	System temperature(<string>) is higher.
ERROR	Thermal level 2	System Overheated(<string>)!!!
ERROR	Thermal level 2 shutdown	System Overheated(<string>)!!! The system will auto-shutdown immediately.
ERROR	Thermal level 2 CTR shutdown	The controller will auto shutdown immediately, reason [Overheated(<string>)].
WARNING	Thermal ignore value	Unable to update thermal value on <string>
WARNING	Voltage level 1	System voltage(<string>) is higher/lower.
ERROR	Voltage level 2	System voltages(<string>) failed!!!

ERROR	Voltage level 2 shutdown	System voltages(<string>) failed!!! The system will auto-shutdown immediately.
ERROR	Voltage level 2 CTR shutdown	The controller will auto shutdown immediately, reason [Voltage abnormal(<string>)].
INFO	UPS OK	Successfully detect UPS
WARNING	UPS fail	Failed to detect UPS
ERROR	UPS AC loss	AC loss for system is detected
ERROR	UPS power low	UPS Power Low!!! The system will auto-shutdown immediately.
WARNING	SMART T.E.C.	Disk <slot> S.M.A.R.T. Threshold Exceed Condition occurred for attribute <string>
WARNING	SMART fail	Disk <slot>: Failure to get S.M.A.R.T information
WARNING	RedBoot failover	RedBoot failover event occurred
WARNING	Watchdog shutdown	Watchdog timeout shutdown occurred
WARNING	Watchdog reset	Watchdog timeout reset occurred

RMS Events

Level	Type	Description
INFO	Console Login	<username> login from <IP or serial console> via Console UI
INFO	Console Logout	<username> logout from <IP or serial console> via Console UI
INFO	Web Login	<username> login from <IP> via Web UI
INFO	Web Logout	<username> logout from <IP> via Web UI
INFO	Log clear	All event logs are cleared
WARNING	Send mail fail	Failed to send event to <email>.

LVM Events

Level	Type	Description
INFO	RG create OK	RG <name> has been created.
INFO	RG create fail	Failed to create RG <name>.
INFO	RG delete	RG <name> has been deleted.
INFO	RG rename	RG <name> has been renamed as <name>.
INFO	VD create OK	VD <name> has been created.
INFO	VD create fail	Failed to create VD <name>.
INFO	VD delete	VD <name> has been deleted.
INFO	VD rename	Name of VD <name> has been renamed to <name>.
INFO	VD read only	Cache policy of VD <name> has been set as read only.
INFO	VD write back	Cache policy of VD <name> has been set as write-back.
INFO	VD write through	Cache policy of VD <name> has been set as write-through.
INFO	VD extend	Size of VD <name> extends.
INFO	VD attach LUN OK	VD <name> has been LUN-attached.
INFO	VD attach LUN fail	Failed to attach LUN to VD <name>.
INFO	VD detach LUN OK	VD <name> has been detached.
INFO	VD detach LUN fail	Failed to attach LUN from bus <number>, SCSI ID <number>, lun <number>.
INFO	VD init started	VD <name> starts initialization.
INFO	VD init finished	VD <name> completes initialization.
WARNING	VD init failed	Failed to complete initialization of VD <name>.

INFO	VD rebuild started	VD <name> starts rebuilding.
INFO	VD rebuild finished	VD <name> completes rebuilding.
WARNING	VD rebuild failed	Failed to complete rebuild of VD <name>.
INFO	VD migrate started	VD <name> starts migration.
INFO	VD migrate finished	VD <name> completes migration.
ERROR	VD migrate failed	Failed to complete migration of VD <name>.
INFO	VD scrub started	Parity checking on VD <name> starts.
INFO	VD scrub finished	Parity checking on VD <name> completes with <address> parity/data inconsistency found.
INFO	VD scrub aborted	Parity checking on VD <name> stops with <address> parity/data inconsistency found.
INFO	RG migrate started	RG <name> starts migration.
INFO	RG migrate finished	RG <name> completes migration.
INFO	RG move started	RG <name> starts move.
INFO	RG move finished	RG <name> completes move.
INFO	VD move started	VD <name> starts move.
INFO	VD move finished	VD <name> completes move.
ERROR	VD move failed	Failed to complete move of VD <name>.
INFO	VD attach LUN	LUN <number> is attached to VD <name>.
INFO	VD detach LUN	LUN <number> is detached from VD <name>.
INFO	RG activated	RG <name> has been manually activated.
INFO	RG deactivated	RG <name> has been manually deactivated.
DEBUG	VD rewrite started	Rewrite at LBA <address> of VD <name> starts.
DEBUG	VD rewrite finished	Rewrite at LBA <address> of VD <name> completes.
DEBUG	VD rewrite failed	Rewrite at LBA <address> of VD <name> failed.
WARNING	RG degraded	RG <name> is in degraded mode.
WARNING	VD degraded	VD <name> is in degraded mode.
ERROR	RG failed	RG <name> is failed.
ERROR	VD failed	VD <name> is failed.
ERROR	VD IO fault	I/O failure for stripe number <address> in VD <name>.
DEBUG	Recoverable read error	Recoverable read error occurred at LBA <address>-<address> of VD <name>.
WARNING	Recoverable write error	Recoverable write error occurred at LBA <address>-<address> of VD <name>.
DEBUG	Unrecoverable read error	Unrecoverable read error occurred at LBA <address>-<address> of VD <name>.
ERROR	Unrecoverable write error	Unrecoverable write error occurred at LBA <address>-<address> of VD <name>.
ERROR	Config read fail	Config read failed at LBA <address>-<address> of PD <slot>.
ERROR	Config write fail	Config write failed at LBA <address>-<address> of PD <slot>.
ERROR	CV boot error adjust global	Failed to change size of the global cache.
INFO	CV boot global	The global cache is ok.
ERROR	CV boot error create global	Failed to create the global cache.
INFO	PD dedicated spare	Assign PD <slot> to be the dedicated spare disk of RG <name>.
INFO	PD global spare	Assign PD <slot> to Global Spare Disks.

WARNING	PD read error	Read error occurred at LBA <address>-<address> of PD <slot>.
WARNING	PD write error	Write error occurred at LBA <address>-<address> of PD <slot>.
WARNING	Scrub wrong parity	The parity/data inconsistency is found at LBA <address>-<address> when checking parity on VD <name>.
WARNING	Scrub data recovered	The data at LBA <address>-<address> is recovered when checking parity on VD <name>.
WARNING	Scrub recovered data	A recoverable read error occurred at LBA <address>-<address> when checking parity on VD <name>.
WARNING	Scrub parity recovered	The parity at LBA <address>-<address> is regenerated when checking parity on VD <name>.
INFO	PD freed	PD <slot> has been freed from RG <name>.
INFO	RG imported	Configuration of RG <name> has been imported.
INFO	RG restored	Configuration of RG <name> has been restored.
INFO	VD restored	Configuration of VD <name> has been restored.
INFO	PD scrub started	PD <slot> starts disk scrubbing process.
INFO	Disk scrub finished	PD <slot> completed disk scrubbing process.
INFO	Large RG created	A large RG <name> with <number> disks included is created
INFO	Weak RG created	A RG <name> made up disks across <number> chassis is created
INFO	RG size shrunk	The total size of RG <name> shrunk
INFO	VD erase finished	VD <name> finished erasing process.
WARNING	VD erase failed	The erasing process of VD <name> failed.
INFO	VD erase started	VD <name> starts erasing process.
WARNING	RG disk missing	RG <name> can not be activated because of missing disks.
ERROR	PD VD read write fault	Read error at LBA <address>-<address> of PD <slot> and rewrite failed at LBA <address>-<address> of VD <name>.
ERROR	PD IO retry fault	Over I/O retry limit in last 10 minutes on PD <slot>, replacing the disk is highly recommended.
ERROR	PD substitute L2L	Over I/O retry limit in last 10 minutes on PD <slot>, the disk is disabled for automatic rebuilding with PD <slot>.

Snapshot Events

Level	Type	Description
WARNING	Snap mem	Failed to allocate snapshot memory for VD <name>.
WARNING	Snap space overflow	Failed to allocate snapshot space for VD <name>.
WARNING	Snap threshold	The snapshot space threshold of VD <name> has been reached.
INFO	Snap delete	The snapshot VD <name> has been deleted.
INFO	Snap auto delete	The oldest snapshot VD <name> has been deleted to obtain extra snapshot space.
INFO	Snap take	A snapshot on VD <name> has been taken.
INFO	Snap set space	Set the snapshot space of VD <name> to <number> MB.
INFO	Snap rollback started	Snapshot rollback of VD <name> has been started.
INFO	Snap rollback finished	Snapshot rollback of VD <name> has been finished.
WARNING	Snap quota reached	The quota assigned to snapshot <name> is reached.

INFO	Snap clear space	The snapshot space of VD <name> is cleared
------	------------------	--

iSCSI Events

Level	Type	Description
INFO	iSCSI login accepted	iSCSI login from <IP> succeeds.
INFO	iSCSI login rejected	iSCSI login from <IP> was rejected, reason [<string>]
INFO	iSCSI logout recvd	iSCSI logout from <IP> was received, reason [<string>].

Battery Backup Events

Level	Type	Description
INFO	BBM start syncing	Abnormal shutdown detected, start flushing battery-backed data (<number> KB).
INFO	BBM stop syncing	Abnormal shutdown detected, flushing battery-backed data finished
INFO	BBM installed	Battery backup module is detected
INFO	BBM status good	Battery backup module is good
INFO	BBM status charging	Battery backup module is charging
WARNING	BBM status fail	Battery backup module is failed
INFO	BBM enabled	Battery backup feature is <string>.
INFO	BBM inserted	Battery backup module is inserted
INFO	BBM removed	Battery backup module is removed

JBOD Events

Level	Type	Description
INFO	PD upgrade started	JBOD <name> PD [<string>] starts upgrading firmware process.
INFO	PD upgrade finished	JBOD <name> PD [<string>] finished upgrading firmware process.
WARNING	PD upgrade failed	JBOD <name> PD [<string>] upgrade firmware failed.
INFO	PD freed	JBOD <name> PD <slot> has been freed from RG <name>.
INFO	PD inserted	JBOD <name> disk <slot> is inserted into system.
Warning	PD removed	JBOD <name> disk <slot> is removed from system.
ERROR	HDD read error	JBOD <name> disk <slot> read block error
ERROR	HDD write error	JBOD <name> disk <slot> write block error
ERROR	HDD error	JBOD <name> disk <slot> is disabled.
ERROR	HDD IO timeout	JBOD <name> disk <slot> gets no response
INFO	JBOD inserted	JBOD <name> is inserted into system
WARNING	JBOD removed	JBOD <name> is removed from system
WARNING	JBOD SMART T.E.C	JBOD <name> disk <slot>: S.M.A.R.T. Threshold Exceed Condition occurred for attribute <string>
WARNING	JBOD SMART fail	JBOD <name> disk <slot>: Failure to get S.M.A.R.T information
INFO	JBOD CTR inserted	Controller(<number>) of JBOD <name> is inserted into system
WARNING	JBOD CTR removed	Controller(<number>) of JBOD <name> is removed from system
WARNING	JBOD degraded	JBOD <name> is in degraded mode.

INFO	PD dedicated spare	Assign JBOD <name> PD <slot> to be the dedicated spare disk of RG <name>.
INFO	PD global spare	Assign JBOD <name> PD <slot> to Global Spare Disks.
ERROR	Config read fail	Config read error occurred at LBA <address>-<address> of JBOD <name> PD <slot>.
ERROR	Config write fail	Config write error occurred at LBA <address>-<address> of JBOD <name> PD <slot>.
DEBUG	PD read error	Read error occurred at LBA <address>-<address> of JBOD <name> PD <slot>.
WARNING	PD write error	Write error occurred at LBA <address>-<address> of JBOD <name> PD <slot>.
INFO	PD scrub started	JBOD <name> PD <slot> starts disk scrubbing process.
INFO	PD scrub completed	JBOD <name> PD <slot> completed disk scrubbing process.
WARNING	PS fail	Power Supply of <string> in JBOD <name> is FAIL
INFO	PS normal	Power Supply of <string> in JBOD <name> is NORMAL
WARNING	FAN fail	Cooling fan of <string> in JBOD <name> is FAIL
INFO	FAN normal	Cooling fan of <string> in JBOD <name> is NORMAL
WARNING	Volt warn OV	Voltage of <string> read as <string> in JBOD <name> is WARN OVER
WARNING	Volt warn UV	Voltage of <string> read as <string> in JBOD <name> is WARN UNDER
WARNING	Volt crit OV	Voltage of <string> read as <string> in JBOD <name> is CRIT OVER
WARNING	Volt crit UV	Voltage of <item> read as <string> in JBOD <name> is CRIT UNDER
INFO	Volt recovery	Voltage of <string> in JBOD <string> is NORMAL
WARNING	Therm warn OT	Temperature of <string> read as <string> in JBOD <name> is OT WARNING
WARNING	Therm warn UT	Temperature of <string> read as <string> in JBOD <name> is UT WARNING
WARNING	Therm fail OT	Temperature of <string> read as <string> in JBOD <name> is OT FAILURE
WARNING	Therm fail UT	Temperature of <string> read as <string> in JBOD <name> is UT FAILURE
INFO	Therm recovery	Temperature of <string> in JBOD <name> is NORMAL
INFO	JBOD HDD path NG	Path redundancy to JBOD <name> PD <number> is lost
INFO	PD RPS started L2F	Assign JBOD <name> PD <slot> to replace PD <slot>.
INFO	PD RPS started F2L	Assign JBOD <name> PD <slot> to replace JBOD <name> PD <slot>.
INFO	PD RPS started F2F	Assign JBOD <name> PD <slot> to replace JBOD <name> PD <slot>.
INFO	PD RPS finished L2F	PD <slot> is replaced by JBOD <name> PD <slot>.
INFO	PD RPS finished F2L	JBOD <name> PD <slot> is replaced by PD <slot>.
INFO	PD RPS finished F2F	JBOD <name> PD <slot> is replaced by JBOD <name> PD <slot>.
ERROR	PD RPS failed L2F	Failed to replace PD <slot> with JBOD %4d PD <slot>.
ERROR	PD RPS failed F2L	Failed to replace JBOD <name> PD <slot> with PD <slot>.
ERROR	PD RPS failed F2F	Failed to replace JBOD <name> PD <slot> with JBOD <name> PD <slot>.
ERROR	PD VD read write	Read error at LBA <address>-<address> of JBOD <name> PD

	fault	<slot> and rewrite failed at LBA <address>-<address> of VD <name>.
ERROR	PD IO retry fault	Over I/O retry limit in last 10 minutes on JBOD <name> PD <slot>, replacing the disk is highly recommended.
ERROR	PD substitute L2F	Over I/O retry limit in last 10 minutes on PD <slot>, the disk is disabled for automatic rebuilding with JBOD <name> PD <slot>.
ERROR	PD substitute F2L	Over I/O retry limit in last 10 minutes on JBOD <name> PD <slot>, the disk is disabled for automatic rebuilding with PD <slot>.
ERROR	PD substitute F2F	Over I/O retry limit in last 10 minutes on JBOD <name> PD <slot>, the disk is disabled for automatic rebuilding with JBOD <name> PD <slot>.

System Maintenance Events

Level	Type	Description
INFO	System shutdown	System shutdown.
INFO	System reboot	System reboot.
INFO	System console shutdown	System shutdown from <string> via Console UI
INFO	System web shutdown	System shutdown from <string> via Web UI
INFO	System button shutdown	System shutdown via power button
INFO	System LCM shutdown	System shutdown via LCM
INFO	System console reboot	System reboot from <string> via Console UI
INFO	System web reboot	System reboot from <string> via Web UI
INFO	System LCM reboot	System reboot via LCM
INFO	FW upgrade start	System firmware upgrade starts.
INFO	FW upgrade success	System firmware upgrade succeeds.
WARNING	FW upgrade failure	System firmware upgrade is failed.
ERROR	IPC FW upgrade timeout	System firmware upgrade timeout on another controller
INFO	Config imported	<string> config imported

HAC Events

Level	Type	Description
INFO	RG owner changed	The preferred owner of RG <name> has been changed to controller <number>.
INFO	Force CTR write through	Controller <number> forced to adopt write-through mode on failover.
INFO	Restore CTR cache mode	Controller <number> restored to previous caching mode on failback.
INFO	Failover complete	All volumes in controller <number> completed failover process.

INFO	Failback complete	All volumes in controller <number> completed failback process.
INFO	CTR inserted	Controller <number> is inserted into system
ERROR	CTR removed	Controller <number> is removed from system
ERROR	CTR timeout	Controller <number> gets no response
ERROR	CTR lockdown	Controller <number> is locked down
ERROR	CTR memory NG	Memory size mismatch
ERROR	CTR firmware NG	Firmware version mismatch
ERROR	CTR lowspeed NG	Low speed inter link is down
ERROR	CTR highspeed NG	High speed inter link is down
ERROR	CTR backend NG	SAS expander is down
ERROR	CTR frontend NG	FC IO controller is down
INFO	CTR reboot FW sync	Controller reboot, reason [Firmware synchronization completed]

Clone Events

Level	Type	Description
INFO	VD clone started	VD <name> starts cloning process.
INFO	VD clone finished	VD <name> finished cloning process.
WARNING	VD clone failed	The cloning in VD <name> failed.
INFO	VD clone aborted	The cloning in VD <name> was aborted.
INFO	VD clone set	The clone of VD <name> has been designated.
INFO	VD clone reset	The clone of VD <name> is no longer designated.
WARNING	Auto clone error	Auto clone task: <string>.
WARNING	Auto clone no snap	Auto clone task: Snapshot <name> is not found for VD <name>.

QReplia Events

Level	Type	Description
INFO	Qrep portal enabled	Replication portal is enabled
INFO	Qrep portal disabled	Replication portal is disabled
INFO	VD replicate started	VD <name> starts replication process.
INFO	VD replicate finished	VD <name> finished replication process.
WARNING	VD replicate failed	The replication in VD <name> failed.
INFO	VD replicate aborted	The replication in VD <name> was aborted.
INFO	VD set as replica	VD <name> has been configured as a replica.
INFO	VD set as RAID	VD <name> has been configured as a RAID volume.
INFO	VD replica set	The replica of VD <name> has been designated.
INFO	VD replica reset	The replica of VD <name> is no longer designated.
WARNING	Auto qrep not enable	Auto QReplia task: QReplia is not enabled for VD <name>.
WARNING	Auto qrep error	Auto QReplia task: <string>.
WARNING	Auto qrep no snap	Auto QReplia task: Snapshot <name> is not found for VD <name>.

INFO	Source started	replicate	Remote VD <name> starts replicating to VD <name>.
INFO	Source finished	replicate	Remote VD <name> finished replication to VD <name>.
INFO	Source failed	replicate	Remote VD <name> failed replication to VD <name>.
INFO	Source aborted	replicate	Remote VD <name> aborted replication to VD <name>.

QThin Events

Level	Type	Description
WARNING	RG threshold hit	The used capacity of RG <name> exceeds <number> percent.
INFO	RAID set created	RAID set <number> has been added into RG <name>.
INFO	RAID set deleted	RAID set <number> was deleted from RG <name>.
INFO	VD reclaim started	VD <name> starts space reclamation process.
INFO	VD reclaim completed	VD <name> finished space reclamation process.
WARNING	VD reclaim aborted	The space reclamation in VD <name> was aborted.

- **DEBUG** level events are displayed in download event log file only.

7

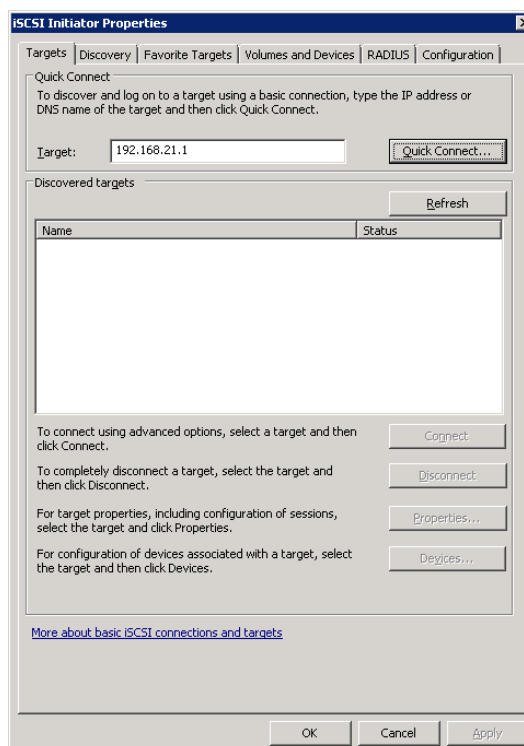
Software Application

Microsoft iSCSI initiator

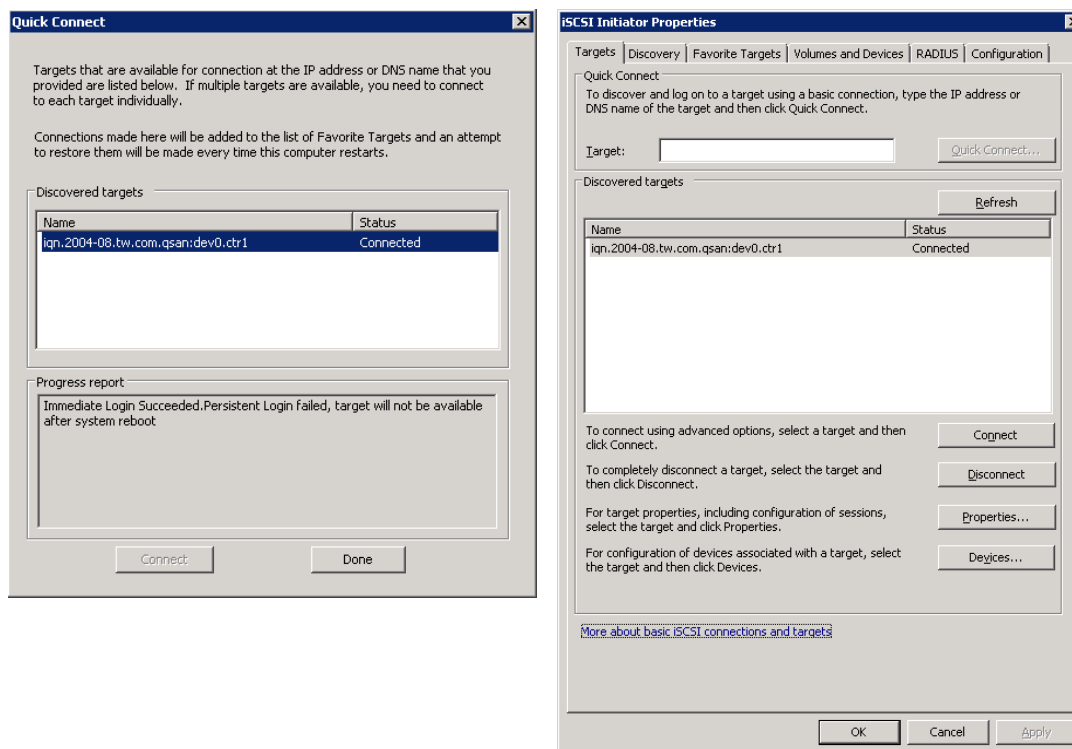
Here is the step by step to setup Microsoft iSCSI Initiator. Please visit Microsoft website for latest iSCSI initiator. This example is based on Microsoft Windows Server 2008 R2.

Connect to iSCSI Target

1. Run Microsoft iSCSI Initiator.
2. Input IP address or DNS name of the target. And then click **Quick Connect** button.



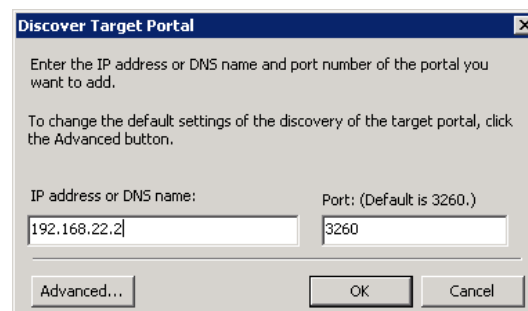
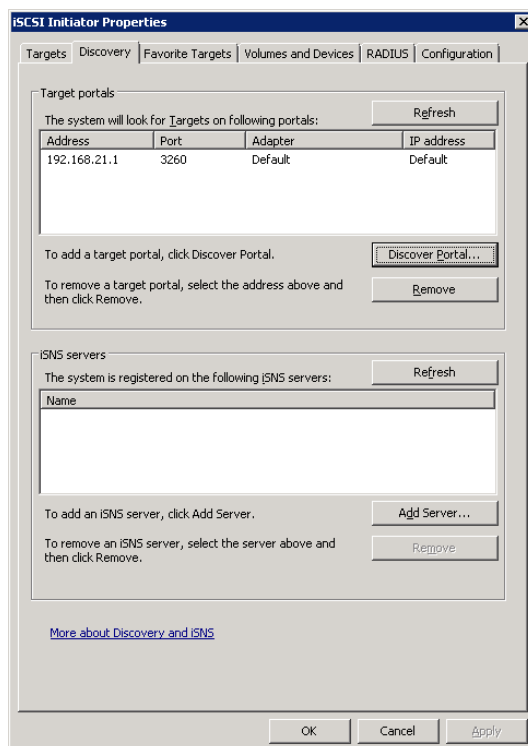
3. Select the target name, and then click **Done** button.



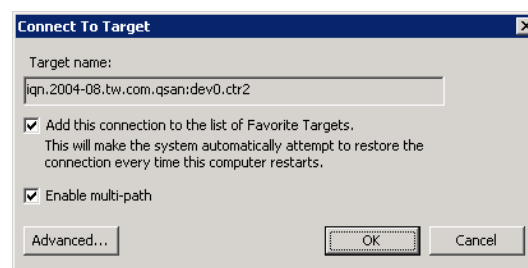
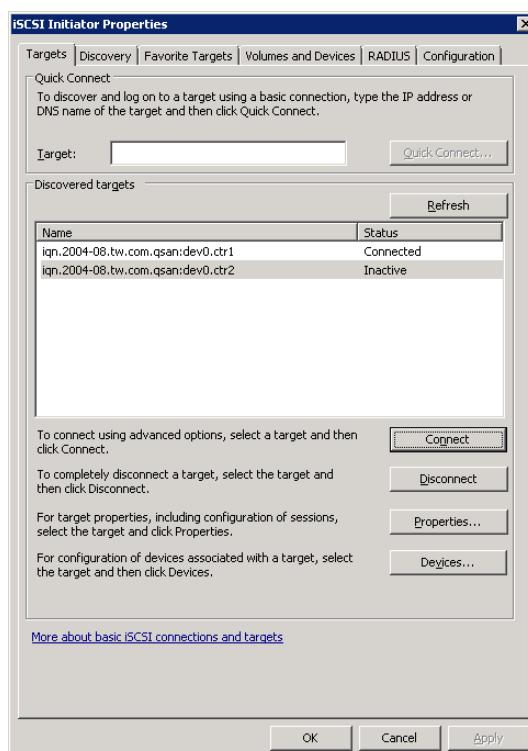
4. It can connect to an iSCSI disk now.

Setup MPIO

1. If running MPIO, please continue.
2. Click **Discovery** tab to connect the second path.
3. Click **Discover Portal** button. Enter the IP address or DNS name of the target.



4. Click **OK** button.

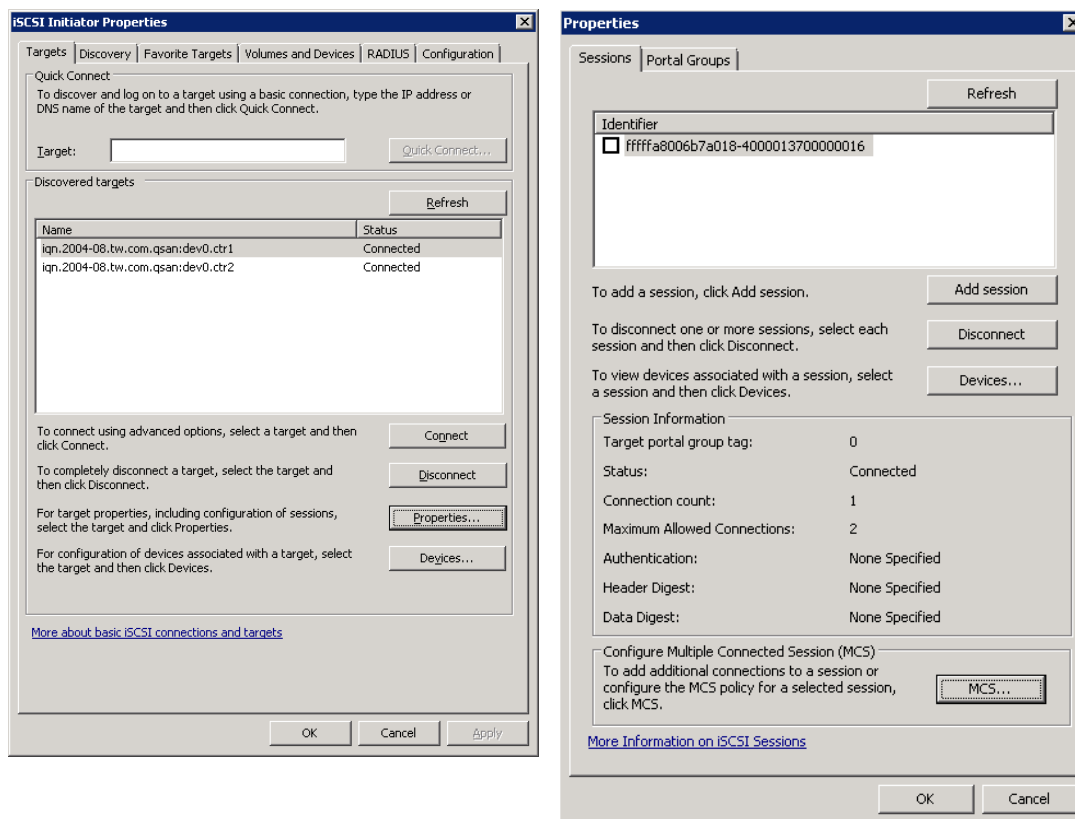


5. Click **Targets** tab, select the second path, and then click **Connect** button.
6. Enable **Enable multi-path** checkbox. Then click **OK** button.

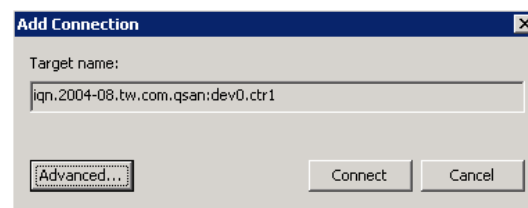
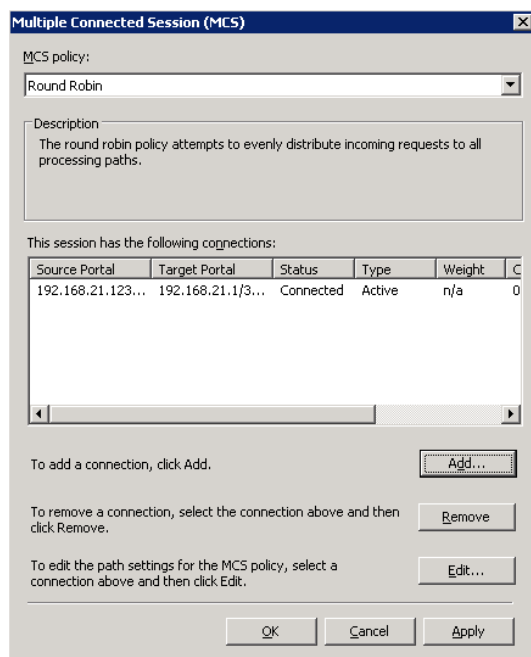
7. Done, it can connect to an iSCSI disk with MPIO.

Setup MC/S

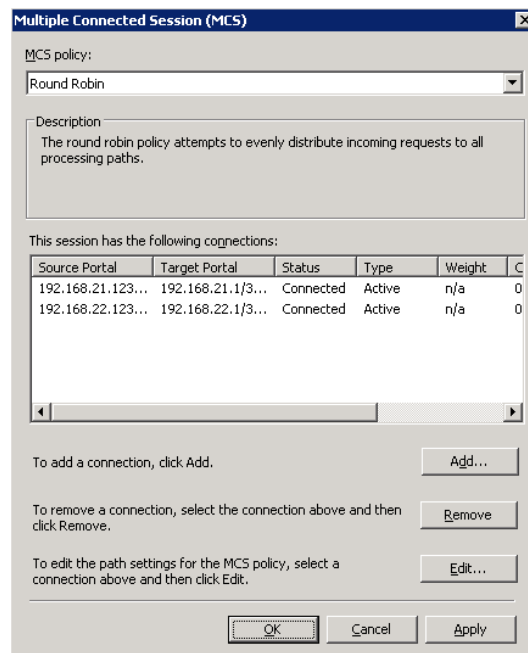
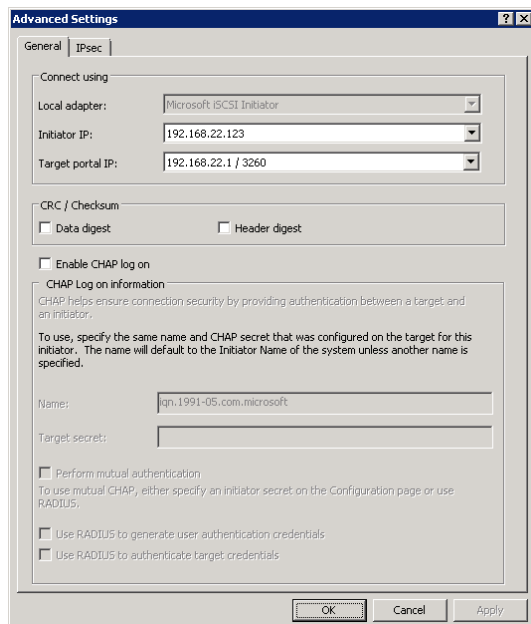
1. If running MC/S, please continue.
2. Select one target name, click **Properties** button.
3. Click **MCS** button to add additional connections.



4. Click **Add** button.
5. Click **Advanced** button.



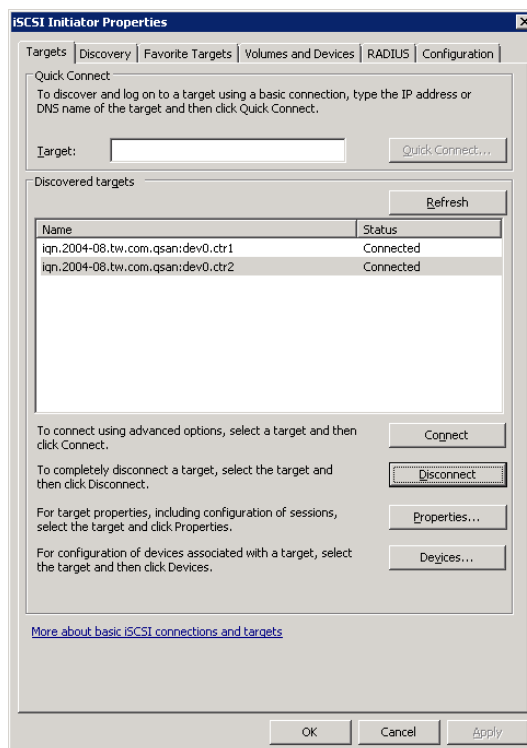
6. Select Initiator IP and Target portal IP, and then click **OK** button.
7. Click **Connect** button.
8. Click **OK** button.



9. Done.

Disconnect

1. Select the target name, click **Disconnect** button, and then click **Yes** button.



2. Done, the iSCSI device disconnect successfully.

Microsoft VSS

Introduction

This document introduces how to perform VSS (Volume Shadow copy Service) function on Qsan systems. It includes Qsan VSS installation and Qsan VSS client usage.

Software contents

Before start using VSS, it is necessary to install the Qsan Storage Service software.

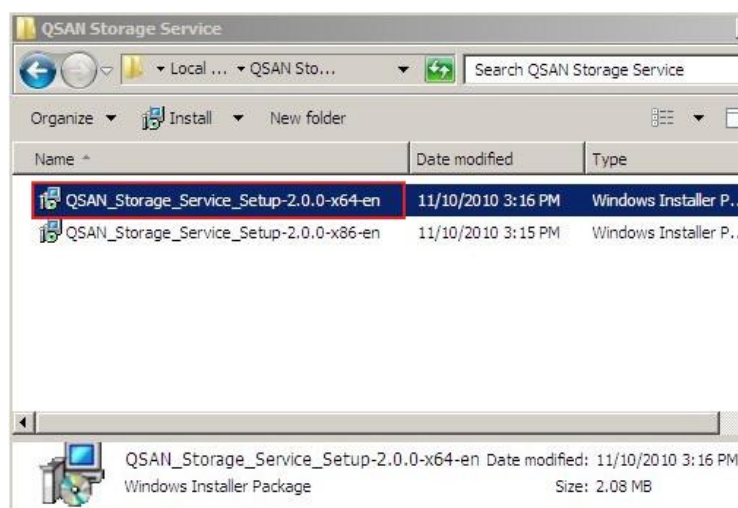
The software includes the following items:

1. Multipath I/O Driver (MPIO)
2. Volume Shadow Copy Service (VSS) (optional)
3. QVolume Shadow Copy Application (optional), this is an application for demo VSS function.

The software has two versions. One is for 32-bits OS (x86), the other is for 64-bit OS (x64). It can be installed in Microsoft Windows Server 2003, 2003 R2, 2008, 2008 R2 only.

Install MPIO, VSS software

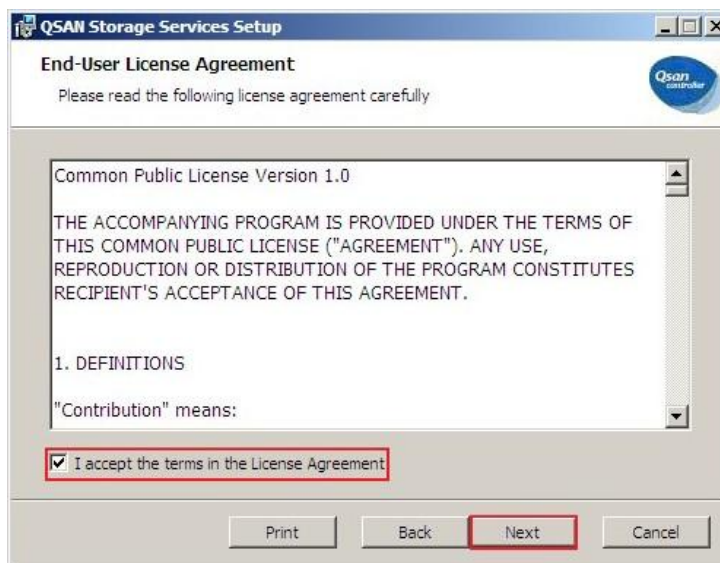
1. Run **QSAN_Storage_Service_Setup-2.0.0-x64-en.msi**. (For windows server 2008 R2)



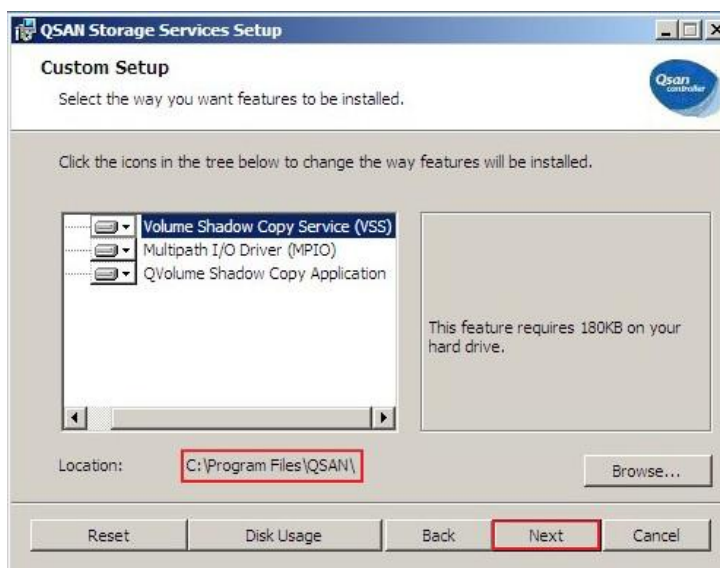
2. Click **Next** button.



3. Check **License Agreement**, and then click **Next** button.



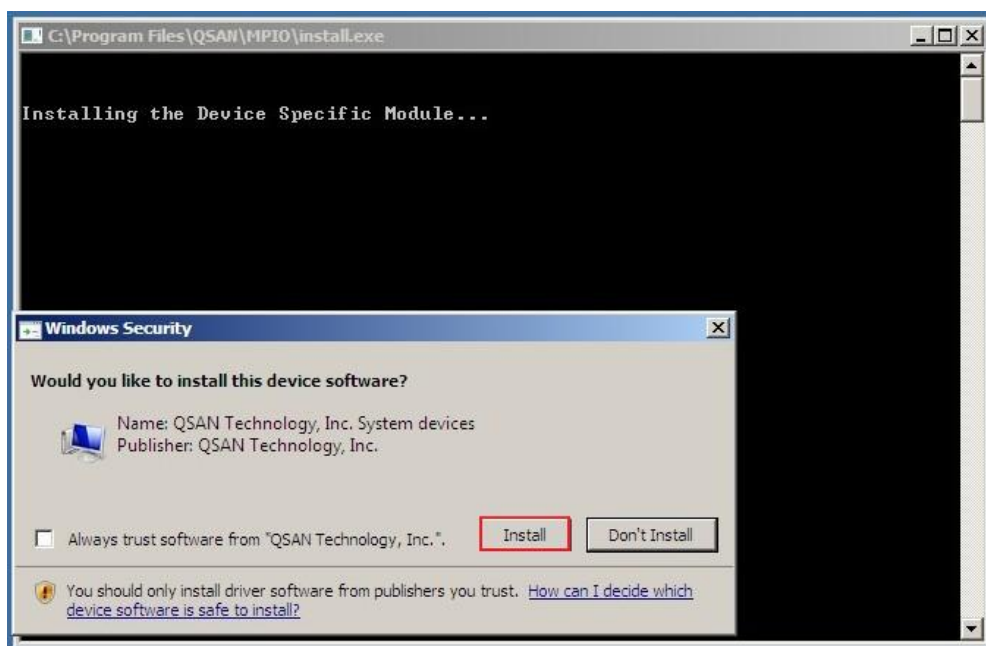
4. Click **Browse** button to change the installation directory. Default is C:\Program Files\QSAN\. Then click **Next** button.



5. Click **Install** button.



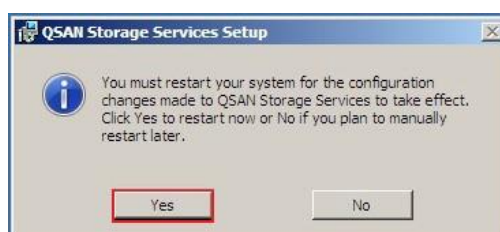
6. There is a Windows Security warning to make sure that this DSM driver is trusted, then click **Install** button.



7. Done.



8. Please reboot the system to ensure the DSM driver take effect.



9. After reboot, use Windows CLI command `vssadmin list providers` to check whether the Qsan VSS hardware provider is installed successfully.

```
Administrator: Command Prompt
Delete Shadows - Delete volume shadow copies
Delete ShadowStorage - Delete volume shadow copy storage associations
List Providers - List registered volume shadow copy providers
List Shadows - List existing volume shadow copies
List ShadowStorage - List volume shadow copy storage associations
List Volumes - List volumes eligible for shadow copies
List Writers - List subscribed volume shadow copy writers
Resize ShadowStorage - Resize a volume shadow copy storage association
Revert Shadow - Revert a volume to a shadow copy
Query Reverts - Query the progress of in-progress revert operations.

C:\Users\Administrator>vssadmin list providers
vssadmin 1.1 - Volume Shadow Copy Service administrative command-line tool
(C) Copyright 2001-2005 Microsoft Corp.

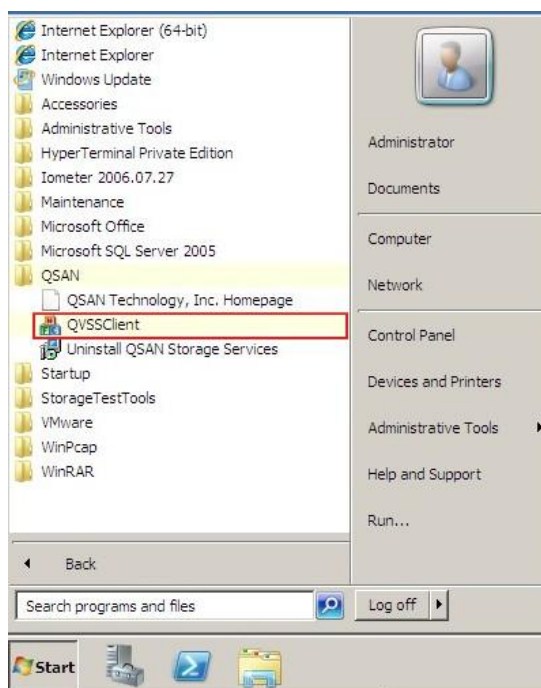
Provider name: 'Qsan USS Hardware Provider'
Provider type: Hardware
Provider Id: {4156a7d3-ebd5-4f51-8585-64957d6c9338}
Version: 1.0

Provider name: 'Microsoft Software Shadow Copy provider 1.0'
Provider type: System
Provider Id: {b5946137-7b9f-4925-af80-51abd60b20d5}
Version: 1.0.0.7

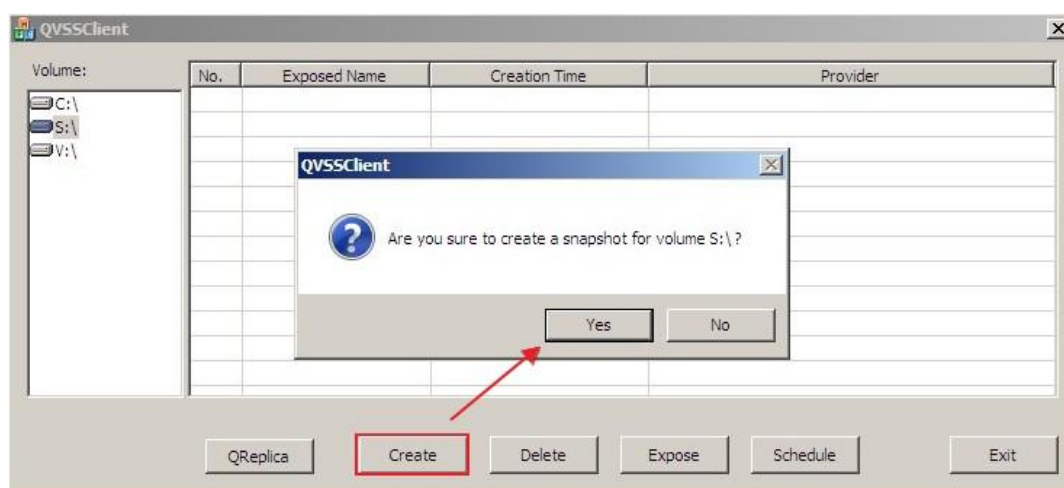
C:\Users\Administrator>
```


Example of Using QVSSClient

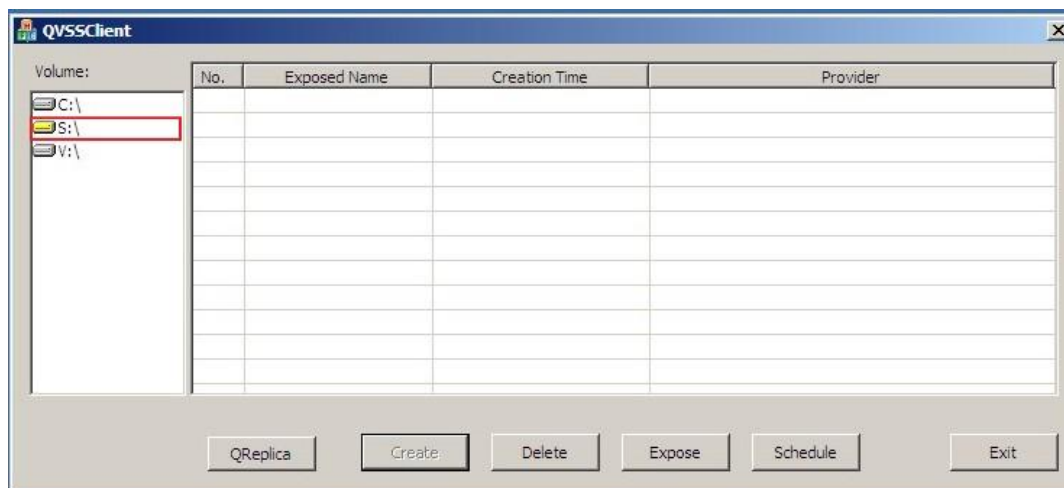
1. Format the disk and assign a drive letter "S:\". This volume is a Virtual disk which comes from Qsan storage system. Click **Start -> All Programs -> QSAN -> QVSSClient** to run the application.



2. Click **Create** button. It will take a snapshot via VSS.



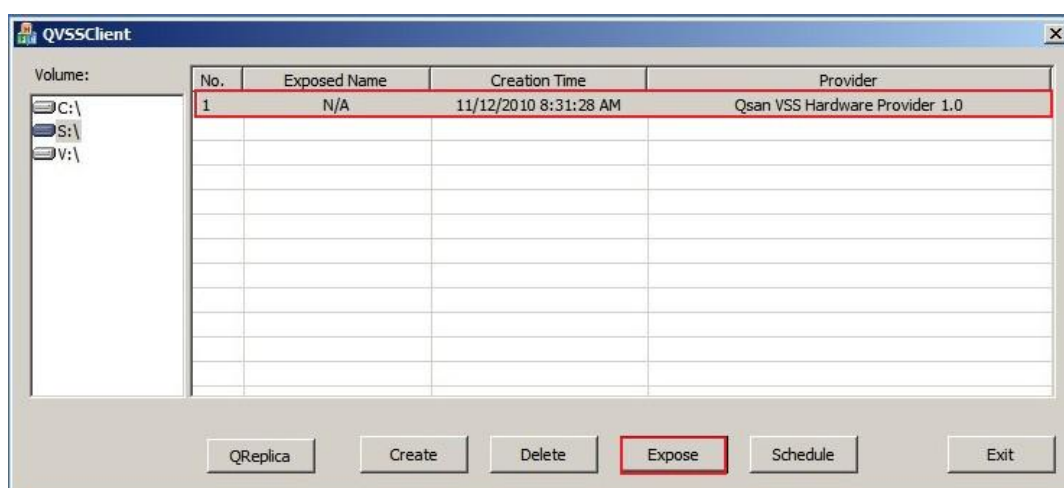
3. During Qsan VSS Hardware Provider is in operation, the volume icon will be displayed in yellow.



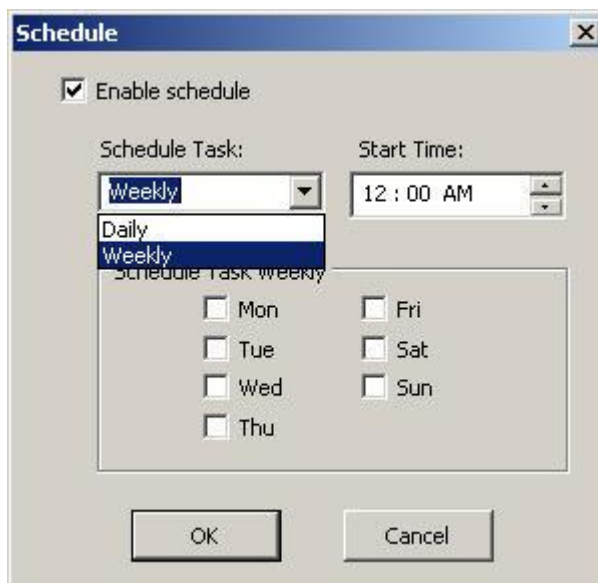
4. Observe the event log on the Qsan storage system, there is an associated snapshot through VSS.

INFO	Fri, 12 Nov 2010 16:34:55	LUN 61 is attached to VD .
INFO	Fri, 12 Nov 2010 16:34:54	VD has been created.
INFO	Fri, 12 Nov 2010 16:34:51	A snapshot on VD VSS_2 has been taken.
INFO	Fri, 12 Nov 2010 16:34:43	Set the snapshot space of VD VSS_2 to 204806 MB.

5. Select the No. 1 column and click **Expose** button, then select a folder. The snapshot will expose to a directory as a disk image format.



6. Click **Schedule** button to enable taking snapshots by schedule.



7. Click **Delete** button to delete the snapshot.

Glossary and Acronym List

Common Terminology

Item	Description
RAID	Redundant Array of Independent Disks. There are different RAID levels with different degree of data protection, data availability, and performance to host environment.
PD	The Physical Disk belongs to the member disk of one specific RAID group.
RG	Raid Group. A collection of removable media. One RG consists of a set of VDs and owns one RAID level attribute.
VD	Virtual Disk. Each RG could be divided into several VDs. The VDs from one RG have the same RAID level, but may have different volume capacity.
LUN	Logical Unit Number. A logical unit number (LUN) is a unique identifier which enables it to differentiate among separate devices (each one is a logical unit).
GUI	Graphic User Interface.
RAID cell	When creating a RAID group with a compound RAID level, such as 10, 30, 50 and 60, this field indicates the number of subgroups in the RAID group. For example, 8 disks can be grouped into a RAID group of RAID 10 with 2 cells, 4 cells. In the 2-cell case, PD {0, 1, 2, 3} forms one RAID 1 subgroup and PD {4, 5, 6, 7} forms another RAID 1 subgroup. In the 4-cells, the 4 subgroups are PD {0, 1}, PD {2, 3}, PD {4, 5} and PD {6, 7}.
WT	Write-Through cache-write policy. A caching technique in which the completion of a write request is not signaled until data is safely stored in non-volatile media. Each data is synchronized in both data cache and accessed physical disks.
WB	Write-Back cache-write policy. A caching technique in which the completion of a write request is signaled as soon as the data is in cache and actual writing to non-volatile media occurs at a later time. It speeds up system write performance but needs to bear the risk where data may be inconsistent between data cache and the physical disks in one short time interval.
RO	Set the volume to be Read-Only.
DS	Dedicated Spare disks. The spare disks are only used by one specific RG. Others could not use these dedicated spare disks for any rebuilding purpose.
GS	Global Spare disks. GS is shared for rebuilding purpose. If some RGs need to use the global spare disks for rebuilding, they could get the spare disks out from the common spare disks pool for such requirement.
DG	DeGraded mode. Not all of the array's member disks are functioning, but the array is able to respond to application read and write requests to its virtual disks.
SCSI	Small Computer Systems Interface.
SAS	Serial Attached SCSI.
S.M.A.R.T.	Self-Monitoring Analysis and Reporting Technology.

WWN	World Wide Name.
HBA	Host Bus Adapter.
SES	SCSI Enclosure Services.
NIC	Network Interface Card.
BBM	Battery Backup Module

FC / iSCSI / SAS Terminology

Item	Description
FC	Fibre Channel.
iSCSI	Internet Small Computer Systems Interface.
LACP	Link Aggregation Control Protocol.
MPIO	Multi-Path Input/Output.
MC/S	Multiple Connections per Session
MTU	Maximum Transmission Unit.
CHAP	Challenge Handshake Authentication Protocol. An optional security mechanism to control access to an iSCSI storage system over the iSCSI data ports.
iSNS	Internet Storage Name Service.
SAS	Serial Attached SCSI.

Dual Controller Terminology

Item	Description
SBB	Storage Bridge Bay. The objective of the Storage Bridge Bay Working Group (SBB) is to create a specification that defines mechanical, electrical and low-level enclosure management requirements for an enclosure controller slot that will support a variety of storage controllers from a variety of independent hardware vendors ("IHVs") and system vendors.
6G MUX	Qsan bridge board is for SATA II disk to support dual controller mode.

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